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RESEARCH MEMORANDUM

THE STATIC LATERAL AND DIRECTIONAL SUBSONIC AERODYNAMIC CHARACTERISTICS OF AN AIRPLANE MODEL HAVING A TRIANGULAR WING OF ASPECT RATIO 3

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THE STATIC LATERAL AND DIRECTIONAL SUBSONIC AERODYNAMIC CHARACTERISTICS OF AN AIRPLANE MODEL HAVING A TRIANGULAR WING OF ASPECT RATIO 3

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SUMMARY

An investigation has been conducted to determine the effects of vertical-tail location and size on the subsonic aerodynamic characteristics of a model having a triangular wing. The wing had an aspect ratio of 3, an NACA 0003.5-63 section in the streamwise direction, and plain, trailing-edge ailerons. The wing was attached to the fuselage in either a mid or high position and an unswept horizontal tail was located on the fuselage center line. Two vertical tails were tested which had areas of 26.7 or 20.3 percent of the wing area. Each vertical tail was equipped with a rudder and had a geometric aspect ratio of 1.5, a taper ratio of 0.16, and 54° of sweepback of the leading edge. Each vertical tail was tested at two different tail lengths. The wind-tunnel tests were conducted at a Reynolds number of 2.5 million at Mach numbers from 0.25 to 0.95.

The directional stability diminished markedly at high angles of attack. The directional stability for a given tail volume was greater for the mid-wing than for the high-wing configuration because of more favorable wing-tail interference. It was found that the contribution of the vertical tail to the directional stability of the fuselage-tail combination at zero angle of attack could be estimated from existing methods. The variation of rudder effectiveness with either angle of attack or sideslip was small. The ailerons were found to provide adequate lateral control. Differential deflection of the two halves of the horizontal tail to provide lateral control was found to be relatively ineffective.

INTRODUCTION

Research has been undertaken in the Ames 12-foot pressure wind tunnel to investigate the aerodynamic characteristics of an interceptortype airplane model having a triangular wing with an aspect ratio of 3. Results of this investigation pertaining to the effects of horizontal-tail location and size and to the effects of trailing-edge flaps have been presented in references 1 and 2.

The present part of the investigation was conducted to evaluate the effects of vertical-tail size and location on the lateral and directional stability. The separate contributions to the directional and lateral stability of the wing-fuselage combination, of the vertical and horizontal tails, and of mutual wing-tail interference were evaluated. The rudder effectiveness and the lateral-control effectiveness of trailing-edge ailerons and of differential deflection of the horizontal tail were also measured. The tests were conducted at Mach numbers up to 0.95 at a Reynolds number of 2.5 million.

NOTATION

Figure 1 shows the sign convention used for presentation of the data. All control-surface deflections are measured in a plane perpendicular to the hinge or pivot line of the control surface. The coefficients and symbols are defined as follows:

A aspect ratio, $\frac{b^2}{S}$

b span

c chord

$\bar{c}$ mean aerodynamic chord

C_L lift coefficient, $\frac{\text{lift}}{qS_W}$

C_m pitching-moment coefficient, $\frac{\text{pitching moment}}{qS_W\bar{c}_W}$

C_Y lateral-force coefficient, $\frac{\text{lateral force}}{qS_W}$

C_n yawing-moment coefficient, $\frac{\text{yawing moment}}{qS_Wb_W}$

C_l rolling-moment coefficient, $\frac{\text{rolling moment}}{qS_Wb_W}$

i_t incidence of the horizontal tail with respect to the wing chord plane, deg

$(i_t)_{av}$ average incidence of the horizontal tail surfaces, deg

Δi_t difference between angles of incidence of the horizontal-tail surfaces, positive to induce positive rolling moment, deg

K_n wing-tail interference factor, $\dfrac{\Delta_2 C_{n_\beta}}{\left[\left(C_{n_\beta}\right)_{vh}\right]_{\alpha = 0^\circ}}$

l_v vertical-tail length, longitudinal distance from moment center $0.375\ \bar{c}_w$ to $\dfrac{\bar{c}_v}{4}$

M free-stream Mach number

n fineness ratio, $\dfrac{\text{fuselage length}}{\text{maximum fuselage diameter}}$

p rolling velocity, radians/sec

q free-stream dynamic pressure

R Reynolds number based on the wing mean aerodynamic chord

S area

V free-stream velocity, ft/sec

X,Y,Z orthogonal coordinates with origin on the fuselage center line at $0.375\ \bar{c}_w$ (fig. 1)

z_v perpendicular distance from fuselage center line to $\dfrac{\bar{c}_v}{4}$

C_{Y_β} $\left(\dfrac{\Delta C_Y}{\Delta\beta}\right)_{\alpha} = \text{constant}$

C_{n_β} $\left(\dfrac{\Delta C_n}{\Delta\beta}\right)_{\alpha} = \text{constant}$

C_{l_β} $\left(\dfrac{\Delta C_l}{\Delta\beta}\right)_{\alpha} = \text{constant}$

$\left(C_{Y_\beta}\right)_{vh}$ $\left(C_{Y_\beta}\right)_{fvh} - \left(C_{Y_\beta}\right)_{f}$

a_{vh} lift-curve slope of vertical tail in combination with horizontal tail and fuselage, at zero angle of attack; based on vertical-tail area

α — angle of attack corrected for tunnel-wall interference, deg

α_u — geometric angle of attack, deg

β — angle of sideslip, deg

η_Y,η_n,η_l — factors used in equations (5), (6), and (7) to account for the effects of angle of attack on the tail contribution to the stability derivatives of the fuselage-tail combination, $\eta_Y = \eta_n = \eta_l = 1.00$ when $\alpha = 0^\circ$

δ_r — rudder deflection, deg

$\Delta\delta_a$ — difference between the deflections of the right and left aileron, positive to induce positive rolling moment, deg

$\left.\begin{matrix}\Delta_1 C_{Y_\beta}\\ \Delta_1 C_{n_\beta}\\ \Delta_1 C_{l_\beta}\end{matrix}\right\}$ — wing-fuselage interference factors; that is,

$$\Delta_1 C_{Y_\beta} = \left(C_{Y_\beta}\right)_{wf} - \left(C_{Y_\beta}\right)_{w} - \left(C_{Y_\beta}\right)_{f}$$

$\left.\begin{matrix}\Delta_2 C_{Y_\beta}\\ \Delta_2 C_{n_\beta}\\ \Delta_2 C_{l_\beta}\end{matrix}\right\}$ — increments in stability derivatives caused by wing interference on the tail effectiveness; that is,

$$\Delta_2 C_{Y_\beta} = \left[\left(C_{Y_\beta}\right)_{wfvh} - \left(C_{Y_\beta}\right)_{wf}\right] - \left[\left(C_{Y_\beta}\right)_{fvh} - \left(C_{Y_\beta}\right)_{f}\right]$$

Subscripts

w — wing

f — fuselage

v — vertical tail

h — horizontal tail

e — effective

MODEL

The geometry of the model is shown in figure 2. The wing had an aspect ratio of 3 and an NACA 0003.5-63 section in the streamwise direction. Two vertical tails were tested which had areas equal to 20.3 and 26.7 percent of the wing area. Each vertical tail had a geometric aspect ratio of 1.5, a taper ratio of 0.16, a thickness-chord ratio of 0.035 in the streamwise direction, and 54° of sweepback of the leading edge. Each vertical tail had a rudder with an area equal to about 10 percent of the vertical-tail area. An unswept horizontal tail with an area equal to

21.9 percent of the wing area and an aspect ratio of 4 was located on the fuselage center line. The fuselage was designed to permit the tail to be placed about 0.45 or 0.60 wing semispans behind the moment center and to permit the wing to be placed either in a mid or high position. Further pertinent geometric details are given in table I, and tail lengths, volumes, heights, and sizes are given in table II.

During the tests to evaluate the static directional and lateral stability, the wing was not equipped with ailerons. (See fig. 3.) At the conclusion of these tests, plain trailing-edge ailerons were installed which had a total area equal to 6.7 percent of the wing area. The ailerons were supported by external brackets and were not sealed.

The components of the model were machined from solid steel and were designed to permit tests of the fuselage alone or in combination with any of the other model components. Forces and moments were measured with a four-component strain-gage balance enclosed within the model body. Whenever six components were desired, it was necessary to rotate the balance 90° about the longitudinal axis of the model and make a second test. The model was mounted on a bent sting which permitted the model to be tested through a range of angles of attack at either 0° or -6° of sideslip. (See fig. 3.) By rolling the model 90° with respect to the sting, tests could be made through a range of angles of sideslip at either 0° or 6° angle of attack.

TEST PROCEDURE

Tests were first conducted to establish that the model was symmetrical and that the variation of C_Y, C_n, and C_l with angle of sideslip was approximately linear. With these factors established, further testing to evaluate the static lateral and directional stability derivatives was limited to varying the angle of attack at an angle of sideslip of about -6°. The lateral and directional stability derivatives were then evaluated by simply dividing the measured coefficient by the angle of sideslip.

Tests at zero sideslip were conducted to evaluate the lateral-control effectiveness of the ailerons and of differential deflection of the two halves of the horizontal tail. Tests to evaluate the rudder effectiveness were conducted both with variable sideslip at about 6° angle of attack and with variable angle of attack with zero sideslip.

The incidence of the horizontal tail was -1.6°, except during the tests to determine its effectiveness as a lateral-control device.

CORRECTIONS TO DATA

The measured angle of attack and angle of sideslip have been corrected for static deflection of the balance and sting. No corrections were added to the angle of attack to account for the induced effects of the tunnel walls resulting from lift on the model. This correction has been calculated by the method of reference 3 and is equal to an increase in the angle of attack of 0.3 C_L. Corrections to account for the induced effect of the tunnel walls on the measured lateral force, yawing moment, rolling moment, and pitching moment were negligible.

The data have been corrected by the method of reference 4 to account for the effects of constriction due to the tunnel walls. At a Mach number of 0.90, this correction amounted to an increase of about 1 percent in the dynamic pressure.

The effect of interference between the model and sting support which could influence the measured forces and moments, particularly those due to the horizontal and vertical tails, is not known. It is believed that the main effect of the sting on the chord force was to alter the pressure at the base of the model body. Consequently, the pressure at the base of the model was measured and the chord force adjusted to correspond to a base pressure equal to free-stream static pressure.

RESULTS

Results are presented in figures 4 and 5 which illustrate that the forces on the model at zero angle of sideslip were, in general, symmetrical with respect to the plane of symmetry for angles of attack less than about 20°, and that the variation of C_Y, C_n, and C_l with angle of sideslip was approximately linear. The capacity of the balance component used to measure lateral force was large compared to the lateral forces since the component was designed to measure normal force. As a result, the accuracy of the lateral-force measurements was limited as is illustrated by the scatter in the lateral-force data. Data showing the effect of sideslip on the lift and pitching moment are presented in figure 6.

The results of the tests to evaluate the static lateral and directional stability derivatives have been tabulated in table III. Sufficient data to illustrate the effects of the various components of the model on the static lateral and directional stability have been presented in figures 7 through 10, and the effect of tail size, tail length, wing height, angle of attack, and Mach number are summarized in figures 11 through 17.

The results of tests to evaluate the lateral-control effectiveness of plain ailerons and of differential deflection of the two halves of the horizontal tail are presented in figures 18 through 22. Some of the results of tests to determine the effectiveness of the rudder are presented in graphical form in figures 23 through 25. The remainder of the results pertaining to rudder effectiveness can be found in table IV.

DISCUSSION

Lateral and Directional Stability Characteristics

Method of analysis.- The data obtained during this investigation permit the static directional and lateral stability for the complete model configurations to be analyzed in terms of the separate contributions of the tail and wing-fuselage combination plus an interference factor. This analysis is similar to that presented in reference 5 except that the method of testing in the present investigation did not permit evaluation of the wing-fuselage interference factors $\Delta_1 C_{Y_\beta}$, $\Delta_1 C_{n_\beta}$, and $\Delta_1 C_{l_\beta}$.

The static derivatives of the complete model can be expressed as

$$\left(C_{Y_\beta}\right)_{wfvh} = \left(C_{Y_\beta}\right)_{wf} + \left(C_{Y_\beta}\right)_{vh} + \Delta_2 C_{Y_\beta} \tag{1}$$

$$\left(C_{n_\beta}\right)_{wfvh} = \left(C_{n_\beta}\right)_{wf} + \left(C_{n_\beta}\right)_{vh} + \Delta_2 C_{n_\beta} \tag{2}$$

$$\left(C_{l_\beta}\right)_{wfvh} = \left(C_{l_\beta}\right)_{wf} + \left(C_{l_\beta}\right)_{vh} + \Delta_2 C_{l_\beta} \tag{3}$$

It is convenient to rewrite equation (2) in the following form:

$$\left(C_{n_\beta}\right)_{wfvh} = \left(C_{n_\beta}\right)_{wf} + \left(\eta_n + K_n\right)\left[\left(C_{n_\beta}\right)_{vh}\right]_{\alpha = 0^\circ} \tag{4}$$

The contribution of the vertical tail to the lateral and directional stability of the fuselage-tail combination can be expressed as

$$\left(C_{Y_\beta}\right)_{vh} = -a_{vh}\left(S_v/S_w\right)\eta_Y \tag{5}$$

$$\left(C_{n_\beta}\right)_{vh} = a_{vh}\left(l_v/b_w\right)\left(S_v/S_w\right)\eta_n \tag{6}$$

$$\left(C_{l_\beta}\right)_{vh} = a_{vh}\left(S_v/S_w\right)\left[\left(l_v/b_w\right)\sin\alpha - \left(z_v/b_w\right)\cos\alpha\right]\eta_l \qquad (7)$$

where a_{vh} is the effective lift-curve slope of the vertical tail in the presence of the fuselage and horizontal tail when the model is at zero angle of attack.

Complete model.- The data obtained with variable sideslip at an angle of attack of about 6° (fig. 5) show that the effective dihedral was positive and that the tail provided directional stability at angles of sideslip up to at least 14° at Mach numbers up to 0.95. The effect of sideslip on the lift and pitching moment was small. (See fig. 6.)

The effect of wing height on the variation of C_{Y_β}, C_{n_β}, and C_{l_β} with angle of attack for the complete model with the largest tail volume is shown in figure 7. For either wing height, the directional stability diminished at the higher angles of attack and the effective dihedral diminished above an angle of attack of from 2° to 4°, depending upon the Mach number. Moving the wing from the fuselage center line to 0.10 $b_w/2$ above the center line decreased the directional stability and increased the effective dihedral.

Wing-fuselage combination.- Data obtained with the tail removed are presented in figure 8. As would be anticipated, the wing-fuselage combination was directionally unstable. A comparison of figures 7 and 8 indicates that the abrupt reduction of the effective dihedral of the complete model between angles of attack of about 4° and 8° was caused by the wing-fuselage combination. Increasing the wing height increased the effective dihedral of the wing-fuselage combination at Mach numbers greater than 0.25 but caused very little change in the directional stability.

The effect of Mach number on the stability derivatives of the wing-fuselage combination at an angle of attack of 0° is shown in figure 11. Increasing the Mach number had no significant effect on either the directional stability, C_{n_β}, or the lateral-force derivative, C_{Y_β}. The effective dihedral, $-C_{l_\beta}$, for the high wing position increased markedly with Mach number as did the parameter, $\partial C_{l_\beta}/\partial\alpha$, for either wing position. It should be emphasized, however, that the data shown in figure 11 are for an angle of attack of 0° and the variation of C_{l_β} with angle of attack became nonlinear at angles of attack above about 3° (fig. 8).

Fuselage-tail combination.- The lateral and directional stability characteristics of the fuselage alone and of the fuselage-tail combination are shown in figure 9. Data which illustrate the end-plate effect of the horizontal tail are presented in figure 10.

The contribution of the vertical tail to the lateral and directional stability of the fuselage-tail combination at zero angle of attack is presented as a function of Mach number in figure 12. The estimated value of this contribution calculated from information presented in references 5, 6, 7, and 8 is also shown in figure 12. The calculation is based on determining the effective aspect ratio of the vertical tail in the presence of the fuselage from reference 5 and the end-plate effect of the horizontal tail from reference 7. The lift-curve slope a_{vh} corresponding to the resulting aspect ratio was evaluated by the method of reference 6 and corrected for the effects of compressibility by the method of reference 8. Equations (5), (6), and (7) were then used to calculate $\left(C_{Y_\beta}\right)_{vh}$, $\left(C_{n_\beta}\right)_{vh}$, and $\left(C_{l_\beta}\right)_{vh}$. This method afforded a reasonable estimation of $\left(C_{n_\beta}\right)_{vh}$ and $\left(C_{l_\beta}\right)_{vh}$ but consistently overestimated $\left(C_{Y_\beta}\right)_{vh}$. Similar agreement between estimated and experimental results is indicated in reference 9 for a tail assembly different from that tested during the present investigation.

The factors given in references 5 and 7 for determining the effective aspect ratio are empirical and were determined from experimental yawing-moment results with the assumption that the center of pressure of the vertical-tail load was at $\bar{c}_v/4$. The effective aspect ratios evaluated from the yawing-moment results of the present investigation agree well with the values estimated from references 5 and 7. (See fig. 13.) It is apparent, then, that the overestimation of $\left(C_{Y_\beta}\right)_{vh}$ must have been due to the center of pressure of the vertical-tail load lying behind its assumed location $\bar{c}_v/4$.

The effect of angle of attack on the parameters $\left(C_{Y_\beta}\right)_{vh}$ and $\left(C_{n_\beta}\right)_{vh}$ was evaluated in terms of the factors η_Y and η_n, respectively. These results, which are presented in figure 14, indicate a reduction in the contribution of the tail to the directional stability of the fuselage-tail combination at high angles of attack except at a Mach number of 0.90 where the factor η_n was about 1.0 at angles of attack greater than about 12°. In general, however, the decrease in the factor η_n with increasing angle of attack became more severe with increasing Mach number. At a Mach number of 0.95, the value of η_n was about 0.70 at an angle of attack of 10°. For a given Mach number, the variation of the factor η_Y with angle of attack was similar to that of η_n.

A direct evaluation of the factor η_l from the experimental results is not practical since the value of the expression $\left(\frac{l_v}{b_w} \sin \alpha - \frac{z_v}{b_w} \cos \alpha\right)$ approaches zero at an angle of attack of between 10° and 18° thereby yielding meaningless values of η_l. (See eq. (7).) It is stated in reference 5 that the value of η_l is usually found to be 1.00. The experimental results of the present investigation also indicate this to be approximately true. This is illustrated in figure 15 where the experimental variation of $\left(C_{l_\beta}\right)_{vh}$ with angle of attack is compared with the variation calculated from equation (7) with η_l set equal to 1.00.

Interference between the wing and tail assembly.- The increments in the lateral and directional stability parameters caused by wing-tail interference are presented in figure 16. It is convenient to reduce $\Delta_2 C_{n_\beta}$ to the factor K_n. Because of the limited accuracy of the measurements, a similar treatment of the lateral-force data is not presented. The factor K_n represents the magnitude of wing-tail interference in terms of the contribution of the tail to the stability of the fuselage-tail combination at an angle of attack of 0°. (See eq. (4).) The variation of K_n with angle of attack is presented in figure 17. A comparison of these results with those presented in figure 14 indicates that the factors K_n and η_n are, in general, compensating. For the mid-wing configurations, the sum of the factors K_n and η_n was between 0.9 and 1.1 at all angles of attack for all Mach numbers. The value of the factor K_n for the high-wing position was about 0.05 less than the value for the mid-wing position at an angle of attack of 0°. This difference became greater with increasing angle of attack which accounts for the reduced directional stability when the wing was in the high position. (See fig. 7.)

The value of the interference factor $\Delta_2 C_{l_\beta}$ (fig. 16(c)) was greater for the high-wing configurations (flagged symbols) than for the mid-wing configuration at Mach numbers greater than 0.25. It is apparent, then, that a part of the increase in effective dihedral of the wing-fuselage combination resulting from moving the wing from the mid to the high position was nullified by wing-tail interference. (Compare figs. 7 and 8.)

Lateral-Control Effectiveness

Trailing-edge ailerons.- The effect of aileron deflection on the longitudinal and lateral characteristics is shown in figure 18. The effect of aileron deflection on the longitudinal characteristics was negligible. The ailerons maintained positive effectiveness throughout the lift range.

Deflection of the ailerons resulted in a small favorable yawing moment at the lower lift coefficients and in an unfavorable yawing moment at the higher lift coefficients.

Because the horizontal tail had such a large span compared to the wing span, it would be anticipated that the rolling moment due to aileron deflection would be altered by the action of the wake on the tail. For this reason tests were conducted with the tail both on and off. The results, which are presented in figure 19, show that the magnitude of this effect was small.

The effect of Mach number on the aileron effectiveness is illustrated in figure 21. The effectiveness of the ailerons as indicated by $\partial C_l/\partial\Delta\delta_a$ increased by about 40 percent as the Mach number was increased from 0.25 to 0.95. The damping in roll at zero angle of attack was calculated and an estimate was made of the wing-tip helix angle $pb/2V$ resulting from 20° of total aileron deflection. The low-speed value of the damping in roll C_{l_p} was calculated by the method of reference 10 and corrections for the effect of compressibility were obtained from reference 8. The results of these calculations indicated that an aileron deflection $\Delta\delta_a$ of 20° would result in a value of $pb/2V$ of about 0.120 at a Mach number of 0.25, and about 0.159 at a Mach number of 0.95. It should be noted, however, that the wing of the model was constructed from solid steel and, hence, aeroelastic effects, which would reduce the effectiveness of the ailerons with increasing dynamic pressure, were minimized.

Horizontal tail as a lateral-control device.- The effects of differential deflection of the two halves of the horizontal tail are shown in figures 20 and 22. Differential deflection of the horizontal tail did not impair its effectiveness as a longitudinal control. However, large differential deflections were required to produce a sizable rolling moment. A large favorable yawing moment accompanied differential deflection of the horizontal tail, undoubtedly resulting from forces induced on the vertical tail. Calculations for the case of zero sideslip and angle of attack showed that the wing-tip helix angle $pb/2V$ for 15.9° differential deflection of the control would be 0.033 at a Mach number of 0.25, and about 0.042 at a Mach number of 0.95. The rolling moment caused by the rudder deflection required to maintain zero sideslip was not considered in this calculation. If the larger of the vertical tails were used, this additional rolling moment at an angle of attack of 0° would increase the calculated helix angle by about 50 percent.

Rudder Effectiveness

Data are presented in figures 23 and 24 which illustrate the effect of a rudder deflection of 10° on C_Y, C_n, and C_l. All the data obtained with the rudder deflected are presented in table IV. The rudder had nearly uniform effectiveness for all values of α and β for which data were obtained. The rudder effectiveness varied only slightly throughout the test range of Mach numbers. (See fig. 25.)

CONCLUSIONS

The results have been presented of a wind-tunnel investigation to evaluate the lateral stability and control characteristics of either mid-wing or high-wing airplane arrangements having a thin triangular wing of aspect ratio 3. The results indicate the following conclusions:

1. The contribution of the tail to the directional stability of the fuselage-tail combination at zero angle of attack could be predicted with sufficient accuracy by existing methods.

2. Increasing the angle of attack reduced the directional stability of a fuselage-tail combination. This reduction became more severe with increasing Mach number.

3. For the mid-wing configuration, a favorable wing-tail interference was sufficient to result in nearly constant directional stability at angles of attack up to about 14°. For the high-wing configuration, the wing-tail interference was less favorable, resulting in less directional stability for a given tail volume, particularly at the higher angles of attack.

4. The effective dihedral was greater for the high-wing than for the mid-wing configuration. The effective dihedral diminished in either case as the angle of attack was increased beyond about 3°.

5. For the solid steel model, for which aeroelastic effects were small, adequate rolling moments could be developed by the trailing-edge ailerons. Large differential deflection of the two halves of the horizontal tail was required to produce a relatively small rolling moment.

6. For the ranges of variables covered in this investigation, the yawing moment resulting from 10° rudder deflection was little affected by angle of attack, angle of sideslip, or Mach number.

Ames Aeronautical Laboratory
National Advisory Committee for Aeronautics
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TABLE I.- GEOMETRIC PROPERTIES OF THE MODEL

Wing (leading and trailing edges extended to plane of symmetry)	
Aspect ratio	3.0
Taper ratio	0
Section	NACA 0003.5-63
Area, sq/ft	4.000
Mean aerodynamic chord, ft	1.540
Span, ft	3.463
Sweepback (leading edge)	53.1°
Ailerons	
Area (each), sq/ft	0.134
Chord, ft	0.208
Span, ft	0.722
Horizontal tail (leading and trailing edges extended to plane of symmetry)	
Aspect ratio	4.00
Taper ratio	0.33
Section	NACA 0004-64
Pivot line (fraction of root chord)	0.45
Area, sq/ft	0.876
Span, ft	1.868
Sweepback (0.50 chord line)	0
Vertical tails (leading and trailing edges extended to fuselage center line)	
Aspect ratio (geometric)	1.5
Taper ratio	0.16
Section	NACA 0003.5-64
Area	
Large, sq/ft	1.067
Small, sq/ft	0.812
Span	
Large, ft	1.269
Small, ft	1.107
Mean aerodynamic chord	
Large, ft	0.988
Small, ft	0.862
Sweepback (leading edge)	54.0°
Rudder Area	
Large, sq ft	0.1081
Small, sq ft	0.0845
Fuselage	
Fineness ratio	
Long fuselage	12.0
Short fuselage	10.9
Base area, sq ft	0.1302

TABLE I.- GEOMETRIC PROPERTIES OF THE MODEL - Concluded

Fuselage (concluded)
Coordinates[1] (long fuselage):

Distance from nose, in.	Radius, in.
0	0
5.00	.80
10.00	1.44
15.00	1.94
20.00	2.32
25.00	2.60
30.00	2.79
35.00	2.90
40.00	2.97
45.00	2.99
51.25	3.00
57.75	3.00
61.75	2.99
65.75	2.90
69.75	2.67
72.00	2.44

[1]Removable section from 51.25 to 57.75 inches from nose.

TABLE II.- MOMENT CENTERS, TAIL LENGTHS, AND TAIL VOLUMES

Moment centers	Tail size, S_v/S_w	Tail length, l_v/b_w	Tail volume, l_vS_v/b_wS_w	Tail height, z_v/b_w
0.375 $\bar{c}_w$	0.267	0.443	0.118	0.139
	.267	.599	.160	.139
	.203	.463	.094	.121
	.203	.620	.126	.121

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA
(a) Complete model

M	α_u	Mid-wing					
		S_v/S_w=0.203 , l_v/b_w=0.463			S_v/S_w=0.267 , l_v/b_w=0.443		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0077	0.00311	-0.00070	-0.0132	0.00428	-0.00137
	-2.0	-0.0094	0.00319	-0.00084	-0.0116	0.00443	-0.00141
	0	-0.0088	0.00319	-0.00100	-0.0139	0.00447	-0.00153
	2.0	-0.0100	0.00302	-0.00122	-0.0140	0.00457	-0.00175
	4.0	-0.0097	0.00313	-0.00140	-0.0120	0.00473	-0.00184
	6.0	-0.0104	0.00338	-0.00149	-0.0121	0.00489	-0.00185
	7.0	-0.0118	0.00347	-0.00140	-0.0102	0.00497	-0.00168
	8.0	-0.0122	0.00346	-0.00131	-0.0118	0.00496	-0.00163
	9.0	-0.0121	0.00349	-0.00132	-0.0123	0.00507	-0.00167
	10.0	-0.0107	0.00353	-0.00124	-0.0120	0.00494	-0.00156
	12.0	-0.0087	0.00359	-0.00101	-0.0116	0.00499	-0.00129
	14.0	-0.0084	0.00337	-0.00100	-0.0123	0.00490	-0.00120
	16.0	-0.0103	0.00315	-0.00094	-0.0119	0.00471	-0.00109
	17.5	-0.0099	0.00274	-0.00102	-0.0117	0.00425	-0.00099
0.60	-4.0	-0.0093	0.00337	-0.00068	-0.0123	0.00461	-0.00146
	-2.0	-0.0101	0.00344	-0.00086	-0.0129	0.00468	-0.00163
	0	-0.0100	0.00345	-0.00109	-0.0129	0.00473	-0.00179
	2.0	-0.0103	0.00354	-0.00138	-0.0129	0.00479	-0.00194
	4.0	-0.0097	0.00362	-0.00149	-0.0130	0.00491	-0.00203
	6.0	-0.0097	0.00370	-0.00147	-0.0137	0.00504	-0.00196
	7.0	-0.0104	0.00375	-0.00133	-0.0141	0.00516	-0.00181
	8.0	-0.0103	0.00379	-0.00114	-0.0142	0.00524	-0.00159
	9.0	-0.0105	0.00380	-0.00118	-0.0143	0.00527	-0.00163
	10.0	-0.0106	0.00387	-0.00118	-0.0130	0.00528	-0.00164
	12.0	-0.0107	0.00376	-0.00114	-0.0137	0.00531	-0.00153
	14.0	-0.0104	0.00345	-0.00089	-0.0132	0.00502	-0.00122
	16.0	-0.0100	0.00312	-0.00097	-0.0125	0.00472	-0.00121
	17.5	-0.0091	0.00261	-0.00102	-0.0119	0.00421	-0.00116
0.80	-4.0	-0.0103	0.00374	-0.00071	-0.0137	0.00527	-0.00152
	-2.0	-0.0105	0.00375	-0.00091	-0.0131	0.00529	-0.00167
	0	-0.0104	0.00377	-0.00116	-0.0135	0.00531	-0.00181
	2.0	-0.0108	0.00382	-0.00149	-0.0136	0.00542	-0.00211
	4.0	-0.0108	0.00388	-0.00156	-0.0135	0.00554	-0.00213
	6.0	-0.0110	0.00396	-0.00141	-0.0135	0.00572	-0.00192
	7.0	-0.0116	0.00403	-0.00118	-0.0144	0.00586	-0.00166
	8.0	-0.0115	0.00408	-0.00082	-0.0149	0.00595	-0.00126
	9.0	-0.0113	0.00414	-0.00139	-0.0148	0.00601	-0.00172
	10.0	-0.0108	0.00421	-0.00122	-0.0150	0.00609	-0.00160
	12.0	-0.0116	0.00407	-0.00097	-0.0151	0.00593	-0.00123
	14.0	-0.0103	0.00365	-0.00110	-0.0152	0.00553	-0.00129
	16.0	-0.0102	0.00317	-0.00107	-0.0147	0.00507	-0.00120
	17.5	-0.0071	0.00181	-0.00065	-0.0146	0.00349	-0.00049
0.90	-4.0	-0.0106	0.00405	-0.00070	-0.0147	0.00564	-0.00165
	-2.0	-0.0111	0.00407	-0.00091	-0.0147	0.00576	-0.00183
	0	-0.0107	0.00408	-0.00120	-0.0146	0.00577	-0.00201
	2.0	-0.0114	0.00418	-0.00156	-0.0142	0.00582	-0.00237
	4.0	-0.0116	0.00425	-0.00165	-0.0146	0.00584	-0.00238
	6.0	-0.0113	0.00424	-0.00142	-0.0144	0.00592	-0.00204
	7.0	-0.0115	0.00430	-0.00107	-0.0150	0.00609	-0.00170
	8.0	-0.0120	0.00436	-0.00069	-0.0155	0.00617	-0.00130
	9.0	-0.0117	0.00443	-0.00128	-0.0157	0.00629	-0.00125
	10.0	-0.0118	0.00446	-0.00102	-0.0154	0.00630	-0.00177
	12.0	-0.0117	0.00431	-0.00085	-0.0158	0.00624	-0.00154
	14.0	-0.0118	0.00409	-0.00111	-0.0150	0.00585	-0.00170
	16.0	-0.0112	0.00373	-0.00129	-0.0148	0.00586	-0.00189
0.93	-4.0	-0.0121	0.00428	-0.00061	-0.0142	0.00575	-0.00152
	-2.0	-0.0122	0.00427	-0.00090	-0.0142	0.00577	-0.00178
	0	-0.0119	0.00429	-0.00120	-0.0143	0.00575	-0.00197
	2.0	-0.0121	0.00435	-0.00165	-0.0140	0.00560	-0.00231
	4.0	-0.0118	0.00421	-0.00181	-0.0139	0.00542	-0.00243
	6.0	-0.0116	0.00425	-0.00147	-0.0141	0.00570	-0.00202
	7.0	-0.0124	0.00427	-0.00108	-0.0147	0.00600	-0.00161
	8.0	-0.0126	0.00437	-0.00062	-0.0155	0.00599	-0.00120
	9.0	-0.0129	0.00447	-0.00027	-0.0162	0.00642	-0.00075
	10.0	-0.0130	0.00444	0.00003	-0.0162	0.00650	-0.00040
	12.0	-0.0129	0.00420	-0.00024	-0.0158	0.00625	-0.00064
0.95	-4.0	-0.0118	0.00430	-0.00050	-0.0153	0.00598	-0.00150
	-2.0	-0.0112	0.00430	-0.00083	-0.0154	0.00591	-0.00175
	0	-0.0115	0.00420	-0.00120	-0.0151	0.00579	-0.00202
	2.0	-0.0112	0.00423	-0.00174	-0.0148	0.00569	-0.00238
	4.0	-0.0099	0.00433	-0.00200	-0.0148	0.00564	-0.00262
	6.0	-0.0110	0.00462	-0.00156	-0.0154	0.00603	-0.00210
	7.0	-0.0112	0.00472	-0.00105	-0.0159	0.00647	-0.00166
	8.0	-0.0112	0.00457	-0.00090	-0.0166	0.00660	-0.00160
	9.0	-0.0107	0.00459	-0.00099	-0.0166	0.00670	-0.00185
	10.0	-0.0109	0.00484	-0.00092	-0.0160	0.00669	-0.00173

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Continued
(a) Complete model - Continued

M	α_u	Mid-wing					
		S_v/S_w = 0.267, l_v/b_w = 0.599			S_v/S_w = 0.203, l_v/b_w = 0.620		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0105	0.00584	-0.00137	-0.0097	0.00414	-0.00077
	-2.0	-0.0101	0.00600	-0.00141	-0.0087	0.00433	-0.00092
	0	-0.0104	0.00615	-0.00153	-0.0104	0.00444	-0.00111
	2.0	-0.0111	0.00630	-0.00170	-0.0099	0.00462	-0.00126
	4.0	-0.0102	0.00653	-0.00174	-0.0079	0.00479	-0.00139
	6.0	-0.0114	0.00662	-0.00171	-0.0096	0.00492	-0.00146
	7.0	— —	— —	— —	-0.0093	0.00477	-0.00128
	8.0	-0.0109	0.00670	-0.00140	-0.0096	0.00483	-0.00122
	9.0	— —	— —	— —	-0.0090	0.00480	-0.00119
	10.0	-0.0117	0.00665	-0.00132	-0.0092	0.00477	-0.00116
	12.0	-0.0112	0.00651	-0.00104	-0.0087	0.00458	-0.00096
	14.0	-0.0110	0.00623	-0.00087	-0.0090	0.00426	-0.00090
	16.0	-0.0100	0.00579	-0.00074	-0.0085	0.00378	-0.00085
	17.5	-0.0091	0.00526	-0.00069	-0.0078	0.00301	-0.00078
0.60	-4.0	-0.0123	0.00631	-0.00159	-0.0088	0.00455	-0.00077
	-2.0	-0.0117	0.00645	-0.00169	-0.0093	0.00466	-0.00091
	0	-0.0127	0.00650	-0.00178	-0.0101	0.00469	-0.00112
	2.0	-0.0127	0.00666	-0.00196	-0.0105	0.00481	-0.00132
	4.0	-0.0128	0.00675	-0.00199	-0.0108	0.00488	-0.00143
	6.0	-0.0132	0.00690	-0.00183	-0.0107	0.00504	-0.00135
	7.0	— —	— —	— —	-0.0106	0.00508	-0.00119
	8.0	-0.0134	0.00702	-0.00142	-0.0106	0.00509	-0.00103
	9.0	— —	— —	— —	-0.0105	0.00504	-0.00103
	10.0	-0.0135	0.00696	-0.00145	-0.0101	0.00497	-0.00110
	12.0	-0.0134	0.00689	-0.00130	-0.0100	0.00482	-0.00095
	14.0	-0.0131	0.00648	-0.00092	-0.0096	0.00439	-0.00072
	16.0	-0.0124	0.00589	-0.00085	-0.0083	0.00372	-0.00074
	17.5	-0.0113	0.00496	-0.00068	-0.0079	0.00275	-0.00062
0.80	-4.0	-0.0135	0.00687	-0.00163	-0.0098	0.00507	-0.00086
	-2.0	-0.0130	0.00702	-0.00175	-0.0101	0.00515	-0.00101
	0	-0.0131	0.00704	-0.00188	-0.0100	0.00517	-0.00122
	2.0	-0.0132	0.00714	-0.00209	-0.0096	0.00524	-0.00152
	4.0	-0.0131	0.00728	-0.00205	-0.0099	0.00538	-0.00154
	6.0	-0.0139	0.00751	-0.00177	-0.0108	0.00551	-0.00133
	7.0	— —	— —	— —	-0.0108	0.00565	-0.00107
	8.0	-0.0142	0.00760	-0.00112	-0.0109	0.00564	-0.00074
	9.0	— —	— —	— —	-0.0115	0.00560	-0.00128
	10.0	-0.0142	0.00771	-0.00141	-0.0118	0.00559	-0.00110
	12.0	-0.0143	0.00757	-0.00101	-0.0117	0.00538	-0.00083
	14.0	-0.0136	0.00705	-0.00099	-0.0110	0.00476	-0.00089
	16.0	-0.0126	0.00627	-0.00072	-0.0089	0.00393	-0.00078
	17.5	-0.0087	0.00410	0.00005	-0.0053	0.00195	-0.00062
0.90	-4.0	-0.0146	0.00765	-0.00172	-0.0109	0.00554	-0.00081
	-2.0	-0.0144	0.00771	-0.00183	-0.0108	0.00566	-0.00099
	0	-0.0143	0.00776	-0.00202	-0.0108	0.00574	-0.00123
	2.0	-0.0144	0.00774	-0.00226	-0.0110	0.00572	-0.00158
	4.0	-0.0143	0.00773	-0.00222	-0.0112	0.00583	-0.00160
	6.0	-0.0148	0.00807	-0.00186	-0.0114	0.00605	-0.00136
	7.0	— —	— —	— —	-0.0118	0.00623	-0.00108
	8.0	-0.0156	0.00852	-0.00122	-0.0115	0.00621	-0.00087
	9.0	— —	— —	— —	-0.0115	0.00617	-0.00142
	10.0	-0.0155	0.00854	-0.00143	-0.0115	0.00613	-0.00115
	12.0	-0.0156	0.00832	-0.00115	-0.0114	0.00578	-0.00096
	14.0	-0.0152	0.00781	-0.00128	-0.0109	0.00541	-0.00117
	16.0	-0.0143	0.00711	-0.00128	-0.0105	0.00499	-0.00141
0.93	-4.0	-0.0148	0.00796	-0.00164	-0.0110	0.00574	-0.00073
	-2.0	-0.0144	0.00801	-0.00183	-0.0111	0.00582	-0.00097
	0	-0.0143	0.00787	-0.00202	-0.0109	0.00577	-0.00123
	2.0	-0.0139	0.00762	-0.00229	-0.0107	0.00566	-0.00161
	4.0	-0.0139	0.00770	-0.00235	-0.0105	0.00568	-0.00177
	6.0	-0.0145	0.00822	-0.00189	-0.0114	0.00598	-0.00140
	7.0	— —	— —	— —	-0.0119	0.00622	-0.00098
	8.0	-0.0155	0.00867	-0.00100	-0.0122	0.00635	-0.00060
	9.0	—	— —	— —	-0.0123	0.00634	-0.00021
	10.0	-0.0161	0.00873	-0.00018	-0.0123	0.00623	-0.00014
	12.0	-0.0155	0.00818	-0.00115	-0.0122	0.00587	-0.00037
0.95	-4.0	-0.0149	0.00809	-0.00155	-0.0107	0.00574	-0.00064
	-2.0	-0.0149	0.00815	-0.00177	-0.0108	0.00572	-0.00092
	0	-0.0147	0.00796	-0.00199	-0.0105	0.00553	-0.00128
	2.0	-0.0145	0.00770	-0.00238	-0.0105	0.00537	-0.00176
	4.0	-0.0149	0.00788	-0.00251	-0.0105	0.00549	-0.00196
	6.0	-0.0154	0.00845	-0.00196	-0.0112	0.00583	-0.00152
	7.0	— —	— —	—	-0.0118	0.00604	-0.00111
	8.0	-0.0155	0.00859	-0.00162	-0.0116	0.00605	-0.00116
	9.0	— —			-0.0122	0.00633	-0.00125
	10.0	-0.0156	0.00890	-0.00152	-0.0120	0.00619	-0.00119

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Continued
(a) Complete model - Continued

M	α_u	High wing					
		S_v/S_w = 0.203 , l_v/b_w = 0.620			S_v/S_w = 0.267 , l_v/b_w = 0.599		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0084	0.00363	-0.00094	-0.0117	0.00503	-0.00159
	-2.0	-0.0089	0.00387	-0.00094	-0.0116	0.00528	-0.00163
	0	-0.0090	0.00395	-0.00118	-0.0123	0.00548	-0.00176
	2.0	-0.0095	0.00403	-0.00138	-0.0126	0.00572	-0.00193
	4.0	-0.0096	0.00415	-0.00157	-0.0130	0.00587	-0.00201
	6.0	-0.0096	0.00424	-0.00155	-0.0131	0.00604	-0.00193
	7.0	-0.0100	0.00427	-0.00145	-0.0133	0.00606	-0.00177
	8.0	-0.0103	0.00419	-0.00135	-0.0131	0.00607	-0.00162
	9.0	-0.0102	0.00410	-0.00127	-0.0128	0.00604	-0.00150
	10.0	-0.0099	0.00414	-0.00122	-0.0127	0.00591	-0.00149
	12.0	-0.0099	0.00373	-0.00116	-0.0129	0.00577	-0.00114
	14.0	-0.0090	0.00322	-0.00074	-0.0121	0.00526	-0.00078
	16.0	-0.0091	0.00249	-0.00057	-0.0117	0.00467	-0.00057
	17.5	-0.0076	0.00160	-0.00049	-0.0108	0.00348	-0.00023
0.60	-4.0	-0.0103	0.00395	-0.00103	-0.0126	0.00554	-0.00186
	-2.0	-0.0103	0.00412	-0.00115	-0.0129	0.00574	-0.00197
	0	-0.0108	0.00419	-0.00138	-0.0129	0.00586	-0.00210
	2.0	-0.0108	0.00424	-0.00162	-0.0129	0.00597	-0.00227
	4.0	-0.0110	0.00436	-0.00172	-0.0135	0.00615	-0.00233
	6.0	-0.0115	0.00437	-0.00159	-0.0140	0.00621	-0.00213
	7.0	-0.0114	0.00436	-0.00150	-0.0141	0.00622	-0.00201
	8.0	-0.0113	0.00430	-0.00136	-0.0142	0.00620	-0.00186
	9.0	-0.0117	0.00417	-0.00114	-0.0144	0.00612	-0.00163
	10.0	-0.0116	0.00402	-0.00124	-0.0140	0.00600	-0.00169
	12.0	-0.0111	0.00360	-0.00086	-0.0140	0.00566	-0.00126
	14.0	-0.0105	0.00291	-0.00066	-0.0133	0.00500	-0.00094
	16.0	-0.0098	0.00197	-0.00054	-0.0125	0.00397	-0.00064
	17.5	-0.0088	0.00067	-0.00023	-0.0110	0.00262	-0.00030
0.80	-4.0	-0.0108	0.00447	-0.00109	-0.0136	0.00622	-0.00193
	-2.0	-0.0107	0.00462	-0.00126	-0.0137	0.00639	-0.00207
	0	-0.0106	0.00469	-0.00147	-0.0136	0.00646	-0.00222
	2.0	-0.0111	0.00474	-0.00178	-0.0138	0.00648	-0.00239
	4.0	-0.0112	0.00483	-0.00180	-0.0142	0.00663	-0.00237
	6.0	-0.0117	0.00486	-0.00157	-0.0144	0.00674	-0.00204
	7.0	-0.0118	0.00485	-0.00136	-0.0147	0.00673	-0.00181
	8.0	-0.0118	0.00470	-0.00104	-0.0146	0.00658	-0.00137
	9.0	-0.0116	0.00457	-0.00142	-0.0145	0.00658	-0.00172
	10.0	-0.0117	0.00445	-0.00130	-0.0148	0.00639	-0.00160
	12.0	-0.0113	0.00387	-0.00086	-0.0146	0.00594	-0.00107
	14.0	-0.0103	0.00303	-0.00083	-0.0135	0.00495	-0.00092
	16.0	-0.0092	0.00193	-0.00084	-0.0123	0.00399	-0.00092
	17.5	-0.0081	0.00081	-0.00088	-0.0105	0.00286	-0.00082
0.90	-4.0	-0.0113	0.00492	-0.00102	-0.0148	0.00700	-0.00188
	-2.0	-0.0114	0.00500	-0.00124	-0.0146	0.00702	-0.00202
	0	-0.0115	0.00502	-0.00153	-0.0144	0.00692	-0.00221
	2.0	-0.0117	0.00506	-0.00185	-0.0146	0.00693	-0.00248
	4.0	-0.0121	0.00517	-0.00189	-0.0152	0.00724	-0.00246
	6.0	-0.0127	0.00523	-0.00157	-0.0157	0.00736	-0.00200
	7.0	-0.0127	0.00516	-0.00132	-0.0159	0.00737	-0.00173
	8.0	-0.0127	0.00510	-0.00180	-0.0157	0.00724	-0.00210
	9.0	-0.0129	0.00493	-0.00151	-0.0157	0.00703	-0.00182
	10.0	-0.0125	0.00465	-0.00135	-0.0153	0.00662	-0.00151
	12.0	-0.0116	0.00389	-0.00104	-0.0139	0.00561	-0.00122
	14.0	-0.0111	0.00317	-0.00101	-0.0135	0.00506	-0.00116
	16.0	-0.0107	0.00287	-0.00107	-0.0126	0.00410	-0.00117
0.93	-4.0	-0.0114	0.00505	-0.00091	-0.0148	0.00720	-0.00186
	-2.0	-0.0116	0.00508	-0.00116	-0.0146	0.00699	-0.00197
	0	-0.0115	0.00501	-0.00150	-0.0146	0.00689	-0.00218
	2.0	-0.0116	0.00496	-0.00191	-0.0146	0.00698	-0.00254
	4.0	-0.0119	0.00501	-0.00209	-0.0150	0.00715	-0.00262
	6.0	-0.0123	0.00519	-0.00161	-0.0157	0.00736	-0.00210
	7.0	-0.0127	0.00515	-0.00130	-0.0159	0.00734	-0.00170
	8.0	-0.0126	0.00501	-0.00089	-0.0160	0.00725	-0.00133
	9.0	-0.0124	0.00484	-0.00055	-0.0158	0.00706	-0.00091
	10.0	-0.0123	0.00448	-0.00020	-0.0154	0.00665	-0.00075
	12.0	-0.0116	0.00370	-0.00075	-0.0142	0.00555	-0.00084
0.95	-4.0	-0.0119	0.00519	-0.00081	-0.0154	0.00736	-0.00180
	-2.0	-0.0122	0.00521	-0.00114	-0.0151	—— ——	—— ——
	0	-0.0120	0.00508	-0.00148	-0.0149	0.00711	-0.00226
	2.0	-0.0120	0.00509	-0.00200	-0.0151	0.00714	-0.00275
	4.0	-0.0124	0.00514	-0.00226	-0.0156	0.00745	-0.00284
	6.0	-0.0129	0.00528	-0.00171	-0.0159	0.00762	-0.00216
	7.0	-0.0130	0.00513	-0.00150	-0.0161	0.00759	-0.00188
	8.0	-0.0128	0.00494	-0.00137	-0.0157	0.00711	-0.00195
	9.0	-0.0129	0.00504	-0.00146	-0.0161	0.00752	-0.00186
	10.0	-0.0131	0.00513	-0.00141	-0.0161	0.00757	-0.00173

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Continued
(a) Complete model - Concluded

M	α_u	High wing					
		S_v/S_w=0.203 , l_v/b_w=0.463			S_v/S_w=0.267 , l_v/b_w=0.443		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0094	0.00248	-0.00096	-0.0106	0.00378	-0.00160
	-2.0	-0.0094	0.00264	-0.00115	-0.0110	0.00383	-0.00168
	0	-0.0100	0.00276	-0.00140	-0.0078	0.00404	-0.00188
	2.0	-0.0100	0.00282	-0.00164	-0.0110	0.00405	-0.00200
	4.0	-0.0096	0.00300	-0.00183	-0.0117	0.00416	-0.00214
	6.0	-0.0108	0.00309	-0.00178	-0.0118	0.00425	-0.00208
	7.0	-0.0106	0.00317	-0.00172	-0.0117	0.00429	-0.00199
	8.0	-0.0105	0.00314	-0.00162	-0.0118	0.00431	-0.00192
	9.0	-0.0107	0.00315	-0.00156	-0.0122	0.00429	-0.00179
	10.0	-0.0105	0.00314	-0.00151	-0.0114	0.00428	-0.00174
	12.0	-0.0108	0.00297	-0.00123	-0.0116	0.00409	-0.00154
	14.0	-0.0103	0.00275	-0.00110	-0.0084	0.00385	-0.00128
	16.0	-0.0099	0.00240	-0.00094	-0.0108	0.00337	-0.00113
	17.5	-0.0090	0.00190	-0.00088	-0.0104	0.00283	-0.00101
0.60	-4.0	-0.0103	0.00274	-0.00103	-0.0120	0.00400	-0.00166
	-2.0	-0.0106	0.00288	-0.00118	-0.0120	0.00400	-0.00178
	0	-0.0106	0.00294	-0.00141	-0.0118	0.00407	-0.00195
	2.0	-0.0106	0.00298	-0.00172	-0.0120	0.00414	-0.00223
	4.0	-0.0110	0.00306	-0.00186	-0.0125	0.00421	-0.00229
	6.0	-0.0112	0.00312	-0.00171	-0.0134	0.00427	-0.00221
	7.0	-0.0114	0.00315	-0.00161	-0.0138	0.00429	-0.00205
	8.0	-0.0115	0.00312	-0.00147	-0.0136	0.00429	-0.00191
	9.0	-0.0114	0.00303	-0.00130	— —	— —	— —
	10.0	-0.0116	0.00300	-0.00141	— —	— —	— —
	12.0	-0.0115	0.00278	-0.00113	— —	— —	— —
	14.0	-0.0110	0.00236	-0.00095	-0.0125	0.00371	-0.00120
	16.0	-0.0105	0.00174	-0.00087	-0.0117	0.00308	-0.00103
	17.5	-0.0095	0.00093	-0.00062	-0.0115	0.00241	-0.00074
0.80	-4.0	-0.0105	0.00315	-0.00107	-0.0133	0.00450	-0.00177
	-2.0	-0.0105	0.00321	-0.00126	-0.0137	0.00463	-0.00194
	0	-0.0109	0.00326	-0.00148	-0.0137	0.00466	-0.00211
	2.0	-0.0113	0.00331	-0.00183	-0.0128	0.00474	-0.00244
	4.0	-0.0118	0.00339	-0.00191	-0.0141	0.00483	-0.00253
	6.0	-0.0122	0.00344	-0.00169	-0.0144	0.00492	-0.00217
	7.0	-0.0126	0.00345	-0.00148	-0.0147	0.00495	-0.00190
	8.0	-0.0126	0.00335	-0.00118	-0.0139	0.00486	-0.00157
	9.0	-0.0130	0.00327	-0.00162	-0.0147	0.00479	-0.00197
	10.0	-0.0129	0.00319	-0.00151	-0.0148	0.00472	-0.00183
	12.0	-0.0130	0.00289	-0.00115	-0.0147	0.00472	-0.00141
	14.0	-0.0124	0.00233	-0.00110	-0.0139	0.00386	-0.00130
	16.0	-0.0117	0.00169	-0.00110	-0.0129	0.00310	-0.00121
	17.5	-0.0113	0.00168	-0.00111	-0.0113	0.00244	-0.00112
0.90	-4.0	-0.0118	0.00360	-0.00097	-0.0147	0.00527	-0.00185
	-2.0	-0.0118	0.00362	-0.00121	-0.0147	0.00535	-0.00203
	0	-0.0118	0.00362	-0.00154	-0.0156	0.00536	-0.00226
	2.0	-0.0118	0.00365	-0.00194	-0.0147	0.00542	-0.00261
	4.0	-0.0122	0.00372	-0.00202	-0.0161	0.00554	-0.00259
	6.0	-0.0127	0.00380	-0.00171	-0.0155	0.00565	-0.00217
	7.0	-0.0129	0.00381	-0.00146	-0.0159	0.00569	-0.00189
	8.0	-0.0130	0.00383	-0.00189	-0.0170	0.00562	-0.00218
	9.0	-0.0128	0.00367	-0.00172	-0.0160	0.00549	-0.00201
	10.0	-0.0129	0.00344	-0.00147	-0.0157	0.00528	-0.00177
	12.0	-0.0118	0.00282	-0.00131	-0.0156	0.00460	-0.00154
	14.0	-0.0112	0.00222	-0.00121	-0.0144	0.00387	-0.00142
	16.0	-0.0105	0.00172	-0.00132	-0.0137	0.00322	-0.00147
0.93	-4.0	-0.0119	0.00376	-0.00087	-0.0152	0.00528	-0.00174
	-2.0	-0.0120	0.00381	-0.00111	-0.0143	0.00533	-0.00198
	0	-0.0118	0.00372	-0.00149	-0.0148	0.00523	-0.00222
	2.0	-0.0118	0.00367	-0.00196	-0.0142	0.00515	-0.00259
	4.0	-0.0120	0.00365	-0.00218	-0.0151	0.00524	-0.00273
	6.0	-0.0126	0.00381	-0.00175	-0.0151	0.00547	-0.00223
	7.0	-0.0128	0.00385	-0.00143	-0.0162	0.00548	-0.00188
	8.0	-0.0128	0.00375	-0.00104	-0.0164	0.00545	-0.00148
	9.0	-0.0127	0.00355	-0.00068	-0.0163	0.00528	-0.00107
	10.0	-0.0125	0.00332	-0.00043	-0.0158	0.00500	-0.00078
	12.0	-0.0117	0.00267	-0.00118	-0.0146	0.00444	-0.00146
0.95	-4.0	-0.0119	0.00387	-0.00082	-0.0152	0.00536	-0.00180
	-2.0	-0.0121	0.00378	-0.00119	-0.0150	0.00528	-0.00201
	0	-0.0117	0.00367	-0.00155	-0.0136	0.00516	-0.00232
	2.0	-0.0119	0.00365	-0.00205	-0.0148	0.00513	-0.00272
	4.0	-0.0121	0.00369	-0.00231	-0.0154	0.00533	-0.00301
	6.0	-0.0128	0.00384	-0.00177	-0.0161	0.00563	-0.00231
	7.0	-0.0127	0.00366	-0.00179	-0.0165	0.00568	-0.00198
	8.0	-0.0129	0.00373	-0.00137	-0.0160	0.00547	-0.00214
	9.0	-0.0129	0.00374	-0.00165	-0.0159	0.00542	-0.00204
	10.0	-0.0125	0.00353	-0.00155	-0.0158	0.00537	-0.00196

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Continued

(b) Wing-fuselage combinations

M	α_u	Mid-wing					
		n = 10.9			n = 12.0		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0008	-0.00096	0.00060	0.0002	-0.00100	0.00050
	-2.0	-0.0005	-0.00094	0.00021	0.0007	-0.00100	0.00030
	0	0	-0.00093	0.00005	0.0012	-0.00110	0
	2.0	-0.0002	-0.00097	-0.00027	0.0017	-0.00100	-0.00030
	4.0	-0.0007	-0.00097	-0.00064	0.0015	-0.00100	-0.00060
	6.0	-0.0008	-0.00089	-0.00084	-0.0007	-0.00100	-0.00090
	7.0	-0.0002	-0.00084	-0.00086	— —	— —	— —
	8.0	-0.0010	-0.00085	-0.00091	-0.0003	-0.00100	-0.00090
	9.0	-0.0014	-0.00083	-0.00102	— —	— —	— —
	10.0	-0.0015	-0.00082	-0.00102	-0.0015	-0.00100	-0.00110
	12.0	-0.0012	-0.00084	-0.00092	0.0007	-0.00090	-0.00100
	14.0	-0.0019	-0.00095	-0.00086	-0.0005	-0.00110	-0.00100
	16.0	-0.0009	-0.00117	-0.00077	0.0010	-0.00140	-0.00090
	17.5	-0.0016	-0.00152	-0.00071	0.0010	-0.00160	-0.00090
0.60	-4.0	-0.0007	-0.00101	0.00077	-0.0030	-0.00119	0.00070
	-2.0	-0.0008	-0.00103	0.00045	-0.0030	-0.00109	0.00040
	0	-0.0005	-0.00104	0.00007	-0.0010	-0.00119	0
	2.0	-0.0005	-0.00103	-0.00040	-0.0020	-0.00109	-0.00040
	4.0	-0.0010	-0.00103	-0.00069	-0.0020	-0.00109	-0.00069
	6.0	-0.0015	-0.00086	-0.00087	-0.0020	-0.00099	-0.00089
	7.0	-0.0017	-0.00095	-0.00084	— —	— —	— —
	8.0	-0.0019	-0.00097	-0.00077	-0.0020	-0.00099	-0.00079
	9.0	-0.0017	-0.00099	-0.00087	— —	— —	— —
	10.0	-0.0019	-0.00094	-0.00096	-0.0020	-0.00089	-0.00099
	12.0	-0.0021	-0.00097	-0.00097	-0.0020	-0.00089	-0.00099
	14.0	-0.0019	-0.00113	-0.00066	-0.0030	-0.00119	-0.00069
	16.0	-0.0023	-0.00135	-0.00061	-0.0030	-0.00139	-0.00059
	17.5	-0.0019	-0.00176	-0.00061	-0.0010	-0.00188	-0.00059
0.80	-4.0	-0.0007	-0.00096	0.00085	-0.0007	-0.00099	0.00080
	-2.0	-0.0007	-0.00101	0.00047	-0.0007	-0.00109	0.00050
	0	-0.0005	-0.00102	0.00005	-0.0007	-0.00109	0
	2.0	-0.0008	-0.00103	-0.00047	-0.0010	-0.00109	-0.00050
	4.0	-0.0013	-0.00101	-0.00073	-0.0010	-0.00099	-0.00069
	6.0	-0.0017	-0.00095	-0.00081	-0.0012	-0.00099	-0.00079
	7.0	-0.0015	-0.00097	-0.00068	— —	— —	— —
	8.0	-0.0015	-0.00101	-0.00048	-0.0017	-0.00099	-0.00049
	9.0	-0.0015	-0.00091	-0.00113	— —	— —	— —
	10.0	-0.0015	-0.00093	-0.00103	-0.0017	-0.00099	-0.00109
	12.0	-0.0019	-0.00103	-0.00081	-0.0019	-0.00108	-0.00079
	14.0	-0.0021	-0.00119	-0.00082	-0.0022	-0.00118	-0.00079
	16.0	-0.0016	-0.00148	-0.00070	-0.0019	-0.00158	-0.00059
	17.5	0.0005	-0.00283	-0.00011	0.0009	-0.00315	-0.00010
0.90	-4.0	-0.0008	-0.00101	0.00095	-0.0010	-0.00109	0.00098
	-2.0	-0.0015	-0.00108	0.00054	-0.0010	-0.00109	0.00049
	0	-0.0015	-0.00111	0.00003	-0.0010	-0.00109	0
	2.0	-0.0020	-0.00109	-0.00057	-0.0015	-0.00109	-0.00059
	4.0	-0.0020	-0.00106	-0.00085	-0.0019	-0.00109	-0.00088
	6.0	-0.0022	-0.00102	-0.00087	-0.0019	-0.00099	-0.00089
	7.0	-0.0024	-0.00100	-0.00075	— —	— —	— —
	8.0	-0.0017	-0.00102	-0.00068	-0.0024	-0.00099	-0.00069
	9.0	-0.0024	-0.00092	-0.00140	— —	— —	— —
	10.0	-0.0026	-0.00098	-0.00121	-0.0024	-0.00099	-0.00119
	12.0	-0.0022	-0.00110	-0.00093	-0.0026	-0.00109	-0.00099
	14.0	-0.0022	-0.00123	-0.00111	-0.0024	-0.00129	-0.00119
	16.0	-0.0021	-0.00128	-0.00144	-0.0026	-0.00138	-0.00148
0.93	-4.0	-0.0002	-0.00101	0.00110	-0.0010	-0.00109	0.00109
	-2.0	-0.0007	-0.00104	0.00057	-0.0010	-0.00109	0.00060
	0	-0.0005	-0.00107	0.00007	-0.0010	-0.00119	0
	2.0	-0.0010	-0.00107	-0.00062	-0.0010	-0.00109	-0.00059
	4.0	-0.0005	-0.00105	-0.00100	-0.0010	-0.00109	-0.00099
	6.0	-0.0017	-0.00100	-0.00088	-0.0020	-0.00099	-0.00089
	7.0	-0.0017	-0.00102	-0.00067	— —	— —	— —
	8.0	-0.0014	-0.00107	-0.00039	-0.0020	-0.00119	-0.00040
	9.0	-0.0012	-0.00116	-0.00015	— —	— —	— —
	10.0	-0.0010	-0.00128	0.00015	-0.0020	-0.00138	0.00010
	12.0	-0.0015	-0.00122	-0.00079	-0.0020	-0.00148	-0.00030
0.95	-4.0	-0.0007	-0.00100	0.00125	-0.0029	-0.00099	0.00119
	-2.0	-0.0007	-0.00104	0.00071	-0.0013	-0.00119	0.00059
	0	-0.0013	-0.00111	0	-0.0008	-0.00109	0
	2.0	-0.0015	-0.00108	-0.00079	-0.0017	-0.00109	-0.00079
	4.0	-0.0017	-0.00101	-0.00130	-0.0020	-0.00109	-0.00119
	6.0	-0.0019	-0.00102	-0.00112	-0.0020	-0.00099	-0.00099
	7.0	-0.0020	-0.00099	-0.00099	— —	— —	— —
	8.0	-0.0020	-0.00097	-0.00102	-0.0022	-0.00109	-0.00069
	9.0	-0.0024	-0.00086	-0.00116	— —	— —	— —
	10.0	-0.0020	-0.00084	-0.00116	-0.0031	-0.00089	-0.00109

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Continued
(b) Wing-fuselage combinations - Concluded

M	α_u	High wing					
		n = 10.9			n = 12.0		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0013	-0.00131	0.00030	0.0007	-0.00131	0.00017
	-2.0	-0.0015	-0.00119	0.00003	0	-0.00120	0.00007
	0	-0.0015	-0.00113	-0.00030	-0.0026	-0.00120	-0.00005
	2.0	-0.0012	-0.00107	-0.00069	-0.0027	-0.00112	-0.00033
	4.0	-0.0018	-0.00101	-0.00107	-0.0022	-0.00101	-0.00067
	6.0	-0.0019	-0.00086	-0.00116	-0.0029	-0.00085	-0.00096
	7.0	-0.0022	-0.00083	-0.00118	-0.0032	-0.00081	-0.00106
	8.0	— —	-0.00071	-0.00115	-0.0034	-0.00080	-0.00102
	9.0	-0.0017	-0.00071	-0.00117	-0.0010	-0.00071	-0.00098
	10.0	-0.0027	-0.00066	-0.00116	-0.0041	-0.00080	-0.00104
	12.0	-0.0033	-0.00067	-0.00098	-0.0041	-0.00077	-0.00087
	14.0	-0.0034	-0.00072	-0.00076	-0.0043	-0.00085	-0.00060
	16.0	-0.0035	-0.00089	-0.00049	-0.0049	-0.00099	-0.00035
	17.5	-0.0032	-0.00109	-0.00034	-0.0023	-0.00104	-0.00072
0.60	-4.0	-0.0006	-0.00128	— —	-0.0029	-0.00137	0.00019
	-2.0	-0.0023	-0.00123	-0.00022	-0.0033	-0.00131	-0.00016
	0	-0.0024	-0.00117	-0.00057	-0.0035	-0.00125	-0.00051
	2.0	-0.0025	-0.00116	-0.00101	-0.0035	-0.00116	-0.00093
	4.0	-0.0028	-0.00106	-0.00128	-0.0039	-0.00108	-0.00121
	6.0	-0.0032	-0.00100	-0.00137	-0.0034	-0.00097	-0.00129
	7.0	-0.0035	-0.00095	-0.00134	-0.0039	-0.00095	-0.00125
	8.0	-0.0037	-0.00097	-0.00128	-0.0050	-0.00099	-0.00120
	9.0	-0.0037	-0.00097	-0.00113	-0.0049	-0.00100	-0.00105
	10.0	-0.0039	-0.00093	-0.00128	-0.0050	-0.00095	-0.00123
	12.0	-0.0045	-0.00098	-0.00103	-0.0056	-0.00102	-0.00095
	14.0	-0.0046	-0.00106	-0.00075	-0.0058	-0.00120	-0.00067
	16.0	-0.0047	-0.00143	-0.00055	-0.0062	-0.00147	-0.00047
	17.5	-0.0048	-0.00174	-0.00023	-0.0062	-0.00178	-0.00011
0.80	-4.0	-0.0023	-0.00132	0.00017	-0.0018	-0.00140	0.00020
	-2.0	-0.0027	-0.00129	-0.00020	-0.0022	-0.00134	-0.00015
	0	-0.0027	-0.00124	-0.00062	-0.0023	-0.00129	-0.00061
	2.0	-0.0027	-0.00119	-0.00114	-0.0020	-0.00123	-0.00111
	4.0	-0.0030	-0.00111	-0.00140	-0.0025	-0.00111	-0.00133
	6.0	-0.0032	-0.00107	-0.00134	-0.0037	-0.00108	-0.00129
	7.0	-0.0034	-0.00109	-0.00122	-0.0039	-0.00110	-0.00116
	8.0	-0.0034	-0.00112	-0.00099	-0.0041	-0.00112	-0.00090
	9.0	-0.0039	-0.00108	-0.00123	-0.0041	-0.00104	-0.00132
	10.0	-0.0037	-0.00106	-0.00136	-0.0045	-0.00108	-0.00127
	12.0	-0.0040	-0.00121	-0.00098	-0.0047	-0.00121	-0.00086
	14.0	-0.0042	-0.00141	-0.00083	-0.0040	-0.00141	-0.00075
	16.0	-0.0041	-0.00172	-0.00083	-0.0048	-0.00176	-0.00076
	17.5	-0.0045	-0.00195	-0.00089	-0.0048	-0.00196	-0.00087
0.90	-4.0	-0.0025	-0.00134	0.00027	-0.0018	-0.00140	0.00030
	-2.0	-0.0030	-0.00128	-0.00018	-0.0022	-0.00138	-0.00017
	0	-0.0030	-0.00131	-0.00066	-0.0023	-0.00132	-0.00067
	2.0	-0.0032	-0.00124	-0.00128	-0.0027	-0.00126	-0.00124
	4.0	-0.0030	-0.00119	-0.00154	-0.0023	-0.00115	-0.00149
	6.0	-0.0040	-0.00114	-0.00143	-0.0037	-0.00110	-0.00141
	7.0	-0.0042	-0.00114	-0.00131	-0.0037	-0.00109	-0.00129
	8.0	-0.0039	-0.00104	-0.00185	-0.0039	-0.00101	-0.00182
	9.0	-0.0044	-0.00103	-0.00175	-0.0034	-0.00106	-0.00163
	10.0	-0.0044	-0.00114	-0.00150	-0.0042	-0.00124	-0.00139
	12.0	-0.0049	-0.00114	— —	-0.0045	-0.00141	-0.00109
	14.0	-0.0047	-0.00151	-0.00114	-0.0047	-0.00160	-0.00113
	16.0	-0.0053	-0.00162	-0.00132	-0.0050	-0.00141	-0.00134
0.93	-4.0	-0.0020	-0.00133	0.00045	-0.0013	-0.00149	0.00045
	-2.0	-0.0021	-0.00131	0.00014	-0.0017	-0.00140	-0.00013
	0	-0.0023	-0.00132	-0.00066	-0.0010	-0.00135	-0.00066
	2.0	-0.0032	-0.00128	-0.00136	-0.0015	-0.00128	-0.00130
	4.0	-0.0030	-0.00120	-0.00176	-0.0025	-0.00121	-0.00169
	6.0	-0.0037	-0.00113	-0.00150	-0.0029	-0.00113	-0.00144
	7.0	-0.0035	-0.00117	-0.00129	-0.0025	-0.00117	-0.00125
	8.0	-0.0039	-0.00126	-0.00097	-0.0034	-0.00124	-0.00099
	9.0	-0.0039	-0.00133	-0.00072	-0.0034	-0.00137	-0.00067
	10.0	-0.0043	-0.00145	-0.00055	-0.0034	-0.00143	-0.00032
	12.0	-0.0050	-0.00126	-0.00144	-0.0034	-0.00161	-0.00062
0.95	-4.0	-0.0017	-0.00142	0.00040	-0.0022	-0.00140	0.00057
	-2.0	-0.0015	-0.00133	-0.00097	-0.0025	-0.00138	-0.00007
	0	-0.0021	-0.00132	-0.00067	-0.0027	-0.00135	-0.00069
	2.0	-0.0023	-0.00126	-0.00159	-0.0032	-0.00126	-0.00147
	4.0	-0.0031	-0.00120	-0.00201	-0.0037	-0.00116	-0.00196
	6.0	-0.0031	-0.00117	-0.00168	-0.0042	-0.00112	-0.00152
	7.0	-0.0038	-0.00116	-0.00162	-0.0045	-0.00112	-0.00136
	8.0	-0.0039	-0.00097	-0.00155	-0.0045	-0.00117	-0.00131
	9.0	-0.0041	-0.00097	-0.00156	-0.0048	-0.00103	-0.00160
	10.0	-0.0046	-0.00110	-0.00161	-0.0055	-0.00087	-0.00152

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Continued
(c) Fuselage-tail combinations

M	α_u	Horizontal tail on					
		S_v/S_w = 0.203 , l_v/b_w = 0.463			S_v/S_w = 0.267 , l_v/b_w = 0.443		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0085	0.00335	-0.00139	-0.0123	0.00438	-0.00211
	-2.0	-0.0095	0.00337	-0.00126	-0.0125	0.00438	-0.00192
	0	-0.0095	0.00338	-0.00108	-0.0121	0.00440	-0.00171
	2.0	-0.0094	0.00315	-0.00094	-0.0118	0.00440	-0.00151
	4.0	-0.0100	0.00323	-0.00084	-0.0120	0.00445	-0.00134
	6.0	-0.0099	0.00326	-0.00074	-0.0117	0.00446	-0.00117
	7.0	-0.0099	0.00329	-0.00073	-0.0116	0.00446	-0.00109
	8.0	-0.0105	0.00328	-0.00064	-0.0114	0.00445	-0.00101
	9.0	-0.0105	0.00325	-0.00059	-0.0112	0.00443	-0.00092
	10.0	-0.0115	0.00316	-0.00053	-0.0111	0.00437	-0.00088
	12.0	-0.0106	0.00308	-0.00045	-0.0108	0.00418	-0.00077
	14.0	-0.0106	0.00284	-0.00050	-0.0105	0.00397	-0.00076
	16.0	-0.0107	0.00278	-0.00035	-0.0105	0.00396	-0.00051
	17.5	-0.0114	0.00255	-0.00023	-0.0102	0.00373	-0.00040
0.60	-4.0	-0.0103	0.00347	-0.00145	-0.0133	0.00476	-0.00221
	-2.0	-0.0103	0.00337	-0.00128	-0.0131	0.00468	-0.00199
	0	-0.0099	0.00333	-0.00113	-0.0129	0.00469	-0.00175
	2.0	-0.0098	0.00327	-0.00101	-0.0125	0.00460	-0.00156
	4.0	-0.0100	0.00329	-0.00090	-0.0123	0.00466	-0.00140
	6.0	-0.0097	0.00330	-0.00078	-0.0124	0.00467	-0.00121
	7.0	-0.0097	0.00331	-0.00074	-0.0124	0.00472	-0.00112
	8.0	-0.0097	0.00329	-0.00069	-0.0123	0.00465	-0.00106
	9.0	-0.0096	0.00325	-0.00066	-0.0123	0.00457	-0.00103
	10.0	-0.0096	0.00329	-0.00058	-0.0120	0.00445	-0.00098
	12.0	-0.0092	0.00302	-0.00055	-0.0114	0.00421	-0.00088
	14.0	-0.0089	0.00285	-0.00050	-0.0111	0.00402	-0.00079
	16.0	-0.0088	0.00272	-0.00040	-0.0109	0.00386	-0.00065
	17.5	-0.0091	0.00254	-0.00032	-0.0108	0.00367	-0.00052
0.80	-4.0	-0.0110	0.00384	-0.00145	-0.0147	0.00540	-0.00236
	-2.0	-0.0106	0.00376	-0.00131	-0.0145	0.00533	-0.00211
	0	-0.0103	0.00373	-0.00114	-0.0140	0.00532	-0.00188
	2.0	-0.0098	0.00355	-0.00100	-0.0134	0.00514	-0.00165
	4.0	-0.0100	0.00356	-0.00090	-0.0135	0.00527	-0.00147
	6.0	-0.0099	0.00359	-0.00080	-0.0133	0.00529	-0.00128
	7.0	-0.0099	0.00355	-0.00080	-0.0132	0.00519	-0.00129
	8.0	-0.0097	0.00353	-0.00075	-0.0127	0.00495	-0.00132
	9.0	-0.0098	0.00354	-0.00062	-0.0129	0.00499	-0.00111
	10.0	-0.0100	0.00356	-0.00050	-0.0126	0.00488	-0.00102
	12.0	-0.0095	0.00338	-0.00047	-0.0122	0.00459	-0.00090
	14.0	-0.0091	0.00312	-0.00045	-0.0119	0.00447	-0.00077
	16.0	-0.0092	0.00306	-0.00035	-0.0119	0.00443	-0.00062
	17.5	-0.0093	0.00306	-0.00023	-0.0118	0.00430	-0.00050
0.90	-4.0	-0.0118	0.00425	-0.00158	-0.0154	0.00574	-0.00251
	-2.0	-0.0117	0.00427	-0.00129	-0.0150	0.00571	-0.00214
	0	-0.0114	0.00419	-0.00114	-0.0145	0.00567	-0.00189
	2.0	-0.0102	0.00362	-0.00099	-0.0137	0.00519	-0.00162
	4.0	-0.0104	0.00380	-0.00087	-0.0139	0.00547	-0.00146
	6.0	-0.0100	0.00356	-0.00098	-0.0131	0.00487	-0.00151
	7.0	-0.0097	0.00349	-0.00095	-0.0128	0.00477	-0.00147
	8.0	-0.0098	0.00351	-0.00086	-0.0125	0.00473	-0.00130
	9.0	-0.0097	0.00347	-0.00079	-0.0124	0.00512	-0.00129
	10.0	-0.0109	0.00410	-0.00033	-0.0119	0.00559	-0.00109
	12.0	-0.0115	0.00434	-0.00017	-0.0138	0.00556	-0.00076
	14.0	-0.0116	0.00444	-0.00005	-0.0136	0.00562	-0.00061
	16.0	-0.0114	0.00444	0	-0.0138	0.00585	-0.00045
0.93	-4.0	-0.0121	0.00430	-0.00174	-0.0157	0.00598	-0.00279
	-2.0	-0.0119	0.00425	-0.00142	-0.0153	0.00589	-0.00231
	0	-0.0114	0.00406	-0.00117	-0.0143	0.00545	-0.00189
	2.0	-0.0102	0.00349	-0.00096	-0.0135	0.00509	-0.00163
	4.0	-0.0100	0.00339	-0.00088	-0.0131	0.00506	-0.00149
	6.0	-0.0094	0.00321	-0.00092	-0.0121	0.00459	-0.00144
	7.0	-0.0092	0.00311	-0.00087	-0.0120	0.00453	-0.00138
	8.0	-0.0090	0.00300	-0.00082	-0.0115	0.00439	-0.00128
	9.0	-0.0088	0.00288	-0.00077	-0.0112	0.00425	-0.00119
	10.0	-0.0081	0.00248	-0.00076	-0.0107	0.00392	-0.00113
	12.0	-0.0102	0.00353	-0.00005	-0.0125	0.00489	-0.00051
0.95	-4.0	-0.0124	0.00463	-0.00159	-0.0167	0.00646	-0.00266
	-2.0	-0.0119	0.00432	-0.00127	-0.0157	0.00619	-0.00221
	0	-0.0110	0.00396	-0.00097	-0.0147	0.00574	-0.00178
	2.0	-0.0101	0.00353	-0.00078	-0.0138	0.00527	-0.00148
	4.0	-0.0098	0.00338	-0.00065	-0.0137	0.00526	-0.00125
	6.0	-0.0089	0.00310	-0.00065	-0.0128	0.00493	-0.00117
	7.0	-0.0085	0.00287	-0.00064	-0.0123	0.00466	-0.00108
	8.0	-0.0081	0.00263	-0.00060	-0.0117	0.00444	-0.00100
	9.0	-0.0074	0.00218	-0.00057	-0.0114	0.00421	-0.00095
	10.0	-0.0071	0.00214	-0.00060	-0.0106	0.00380	-0.00088

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Continued
(c) Fuselage-tail combinations - Continued

M	α_u	Horizontal tail on					
		S_v/S_w =0.203 , l_v/S_w =0.620			S_v/S_w=0.267 , l_v/b_w =0.599		
		C_{Y_β}	C_{r_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0099	0.00468	-0.00145	-0.0125	0.00626	-0.00223
	-2.0	-0.0095	0.00456	-0.00128	-0.0126	0.00614	-0.00199
	0	-0.0089	0.00455	-0.00106	-0.0123	0.00607	-0.00171
	2.0	-0.0093	0.00444	-0.00087	-0.0118	0.00599	-0.00145
	4.0	-0.0092	0.00440	-0.00072	-0.0115	0.00600	-0.00122
	6.0	-0.0089	0.00443	-0.00056	-0.0117	0.00602	-0.00102
	7.0	-0.0093	0.00443	-0.00047	-0.0116	0.00599	-0.00091
	8.0	-0.0091	0.00445	-0.00044	-0.0121	0.00603	-0.00082
	9.0	-0.0090	0.00440	-0.00037	-0.0120	0.00597	-0.00074
	10.0	-0.0088	0.00437	-0.00032	-0.0117	0.00581	-0.00066
	12.0	-0.0086	0.00427	-0.00014	-0.0114	0.00559	-0.00050
	14.0	-0.0083	0.00390	-0.00017	-0.0104	0.00519	-0.00043
	16.0	-0.0085	0.00382	0.00007	-0.0107	0.00515	-0.00016
	17.5	-0.0083	0.00325	0.00014	-0.0104	0.00452	-0.00007
0.60	-4.0	-0.0104	0.00490	-0.00151	-0.0132	0.00670	-0.00235
	-2.0	-0.0102	0.00477	-0.00134	-0.0128	0.00653	-0.00206
	0	-0.0099	0.00469	-0.00112	-0.0126	0.00650	-0.00177
	2.0	-0.0095	0.00456	-0.00093	-0.0123	0.00636	-0.00159
	4.0	-0.0097	0.00454	-0.00066	-0.0122	0.00638	-0.00127
	6.0	-0.0092	0.00461	-0.00062	-0.0123	0.00640	-0.00091
	7.0	-0.0092	0.00463	-0.00055	-0.0121	0.00644	-0.00092
	8.0	-0.0091	0.00457	-0.00052	-0.0125	0.00637	-0.00083
	9.0	-0.0091	0.00448	-0.00047	-0.0122	0.00627	-0.00077
	10.0	-0.0089	0.00445	-0.00036	-0.0120	0.00613	-0.00070
	12.0	-0.0090	0.00427	-0.00026	-0.0116	0.00587	-0.00054
	14.0	-0.0085	0.00401	-0.00016	-0.0112	0.00560	-0.00039
	16.0	-0.0085	0.00367	-0.00001	-0.0111	0.00529	-0.00025
	17.5	-0.0084	0.00324	0	-0.0112	0.00485	-0.00007
0.80	-4.0	-0.0106	0.00531	-0.00159	-0.0140	0.00743	-0.00247
	-2.0	-0.0104	0.00524	-0.00138	-0.0136	0.00726	-0.00217
	0	-0.0102	0.00517	-0.00115	-0.0132	0.00710	-0.00183
	2.0	-0.0097	0.00495	-0.00096	-0.0127	0.00685	-0.00154
	4.0	-0.0098	0.00492	-0.00081	-0.0127	0.00688	-0.00133
	6.0	-0.0096	0.00497	-0.00065	-0.0126	0.00690	-0.00109
	7.0	-0.0097	0.00489	-0.00065	-0.0128	0.00680	-0.00106
	8.0	-0.0095	0.00484	-0.00062	-0.0125	0.00667	-0.00101
	9.0	-0.0097	0.00490	-0.00043	-0.0125	0.00666	-0.00082
	10.0	-0.0099	0.00496	-0.00027	-0.0124	0.00661	-0.00065
	12.0	-0.0100	0.00494	-0.00009	-0.0118	0.00618	-0.00052
	14.0	-0.0092	0.00436	-0.00014	-0.0115	0.00593	-0.00037
	16.0	-0.0092	0.00429	-0.00002	-0.0116	0.00585	-0.00017
	17.5	-0.0094	0.00401	0.00012	-0.0118	0.00581	0.00004
0.90	-4.0	-0.0117	0.00578	-0.00179	-0.0151	0.00789	-0.00267
	-2.0	-0.0112	0.00581	-0.00133	-0.0149	0.00793	-0.00221
	0	-0.0111	0.00566	-0.00115	-0.0140	0.00750	-0.00188
	2.0	-0.0101	0.00502	-0.00091	-0.0135	0.00715	-0.00155
	4.0	-0.0104	0.00520	-0.00072	-0.0136	0.00736	-0.00130
	6.0	-0.0101	0.00505	-0.00078	-0.0130	0.00702	-0.00130
	7.0	-0.0100	0.00502	-0.00073	-0.0127	0.00685	-0.00122
	8.0	-0.0098	0.00497	-0.00065	-0.0126	0.00672	-0.00107
	9.0	-0.0097	0.00492	-0.00054	-0.0123	0.00641	-0.00096
	10.0	-0.0096	0.00485	-0.00063	-0.0120	0.00620	-0.00103
	12.0	-0.0111	0.00583	0.00014	-0.0140	0.00748	-0.00032
	14.0	-0.0112	0.00586	0.00022	-0.0139	0.00751	-0.00012
	16.0	-0.0111	0.00585	0.00038	-0.0139	0.00750	0.00010
0.93	-4.0	-0.0119	0.00598	-0.00181	-0.0151	0.00810	-0.00282
	-2.0	-0.0117	0.00593	-0.00146	-0.0149	0.00801	-0.00229
	0	-0.0113	0.00569	-0.00111	-0.0138	0.00742	-0.00183
	2.0	-0.0100	0.00489	-0.00090	-0.0131	0.00700	-0.00154
	4.0	-0.0099	0.00484	-0.00076	-0.0128	0.00694	-0.00132
	6.0	-0.0096	0.00473	-0.00079	-0.0122	0.00652	-0.00125
	7.0	-0.0095	0.00470	-0.00073	-0.0119	0.00628	-0.00115
	8.0	-0.0093	0.00454	-0.00062	-0.0116	0.00608	-0.00106
	9.0	-0.0089	0.00417	-0.00059	-0.0110	0.00582	-0.00096
	10.0	-0.0082	0.00375	-0.00054	-0.0107	0.00531	-0.00086
	12.0	-0.0101	0.00499	0.00025	-0.0129	0.00684	0
0.95	-4.0	-0.0120	0.00595	-0.00183	-0.0159	0.00846	-0.00293
	-2.0	-0.0118	0.00576	-0.00147	-0.0150	0.00812	-0.00237
	0	-0.0109	0.00528	-0.00116	-0.0138	0.00735	-0.00188
	2.0	-0.0098	0.00461	-0.00090	-0.0131	0.00678	-0.00154
	4.0	-0.0093	0.00437	-0.00077	-0.0126	0.00653	-0.00139
	6.0	-0.0092	0.00439	-0.00072	-0.0119	0.00616	-0.00117
	7.0	-0.0092	0.00423	-0.00069	-0.0118	0.00604	-0.00108
	8.0	-0.0089	0.00412	-0.00060	-0.0115	0.00582	-0.00098
	9.0	-0.0082	0.00359	-0.00064	-0.0108	0.00525	-0.00095
	10.0	-0.0084	0.00400	-0.00047	-0.0101	0.00489	-0.00092

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Continued
(c) Fuselage-tail combinations - Concluded

M	α_u	Horizontal tail off					
		S_v/S_w = 0.203, l_v/b_w = 0.620			S_v/S_w = 0.267, l_v/b_w = 0.599		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0098	0.00446	-0.00160	-0.0113	0.00586	-0.00239
	-2.0	-0.0095	0.00439	-0.00133	-0.0115	0.00580	-0.00213
	0	-0.0089	0.00430	-0.00119	-0.0111	0.00570	-0.00184
	2.0	-0.0090	0.00420	-0.00098	-0.0108	0.00564	-0.00157
	4.0	-0.0087	0.00420	-0.00082	-0.0110	0.00563	-0.00135
	6.0	-0.0089	0.00411	-0.00064	-0.0112	0.00555	-0.00109
	7.0	-0.0088	0.00404	-0.00061	-0.0104	0.00548	-0.00099
	8.0	-0.0086	0.00400	-0.00056	-0.0103	0.00541	-0.00083
	9.0	-0.0085	0.00391	-0.00048	-0.0106	0.00529	-0.00075
	10.0	-0.0088	0.00380	-0.00039	-0.0105	0.00523	-0.00066
	12.0	-0.0086	0.00364	-0.00031	-0.0102	0.00513	-0.00050
	14.0	-0.0083	0.00342	-0.00022	-0.0098	0.00495	-0.00034
	16.0	-0.0080	0.00309	-0.00017	-0.0096	0.00461	-0.00021
	17.5	-0.0078	0.00266	-0.00007	-0.0101	0.00414	-0.00011
0.60	-4.0	-0.0098	0.00457	-0.00168	-0.0120	0.00624	-0.00257
	-2.0	-0.0092	0.00449	-0.00149	-0.0117	0.00611	-0.00225
	0	-0.0090	0.00439	-0.00129	-0.0115	0.00601	-0.00196
	2.0	-0.0088	0.00425	-0.00106	-0.0114	0.00595	-0.00169
	4.0	-0.0087	0.00419	-0.00088	-0.0103	0.00592	-0.00142
	6.0	-0.0086	0.00413	-0.00072	-0.0110	0.00584	-0.00115
	7.0	-0.0088	0.00413	-0.00064	-0.0112	0.00578	-0.00103
	8.0	-0.0089	0.00402	-0.00055	-0.0107	0.00572	-0.00091
	9.0	-0.0087	0.00398	-0.00049	-0.0107	0.00564	-0.00081
	10.0	-0.0086	0.00389	-0.00043	-0.0106	0.00557	-0.00071
	12.0	-0.0083	0.00373	-0.00033	-0.0103	0.00544	-0.00054
	14.0	-0.0079	0.00348	-0.00024	-0.0103	0.00654	-0.00043
	16.0	-0.0076	0.00309	-0.00019	-0.0100	0.00484	-0.00026
	17.5	-0.0075	0.00263	-0.00011	-0.0099	0.00440	-0.00014
0.80	-4.0	-0.0103	0.00498	-0.00182	-0.0125	0.00677	-0.00272
	-2.0	-0.0102	0.00486	-0.00157	-0.0122	0.00662	-0.00238
	0	-0.0095	0.00471	-0.00134	-0.0118	0.00648	-0.00207
	2.0	-0.0094	0.00455	-0.00112	-0.0118	0.00634	-0.00175
	4.0	-0.0093	0.00448	-0.00093	-0.0114	0.00628	-0.00146
	6.0	-0.0092	0.00446	-0.00075	-0.0113	0.00620	-0.00120
	7.0	-0.0092	0.00441	-0.00067	-0.0113	0.00614	-0.00107
	8.0	-0.0092	0.00432	-0.00059	-0.0112	0.00607	-0.00095
	9.0	-0.0093	0.00427	-0.00050	-0.0111	0.00600	-0.00082
	10.0	-0.0091	0.00417	-0.00044	-0.0111	0.00590	-0.00072
	12.0	-0.0090	0.00399	-0.00032	-0.0107	0.00572	-0.00054
	14.0	-0.0086	0.00370	-0.00024	-0.0104	0.00549	-0.00040
	16.0	-0.0083	0.00330	-0.00019	-0.0100	0.00514	-0.00026
	17.5	-0.0080	0.00282	-0.00014	-0.0099	0.00477	-0.00021
0.90	-4.0	-0.0104	0.00527	-0.00189	-0.0133	0.00717	-0.00288
	-2.0	-0.0101	0.00514	-0.00165	-0.0131	0.00705	-0.00252
	0	-0.0099	0.00499	-0.00140	-0.0127	0.00689	-0.00219
	2.0	-0.0096	0.00478	-0.00114	-0.0124	0.00670	-0.00186
	4.0	-0.0096	0.00474	-0.00096	-0.0122	0.00665	-0.00155
	6.0	-0.0095	0.00470	-0.00075	-0.0121	0.00654	-0.00129
	7.0	-0.0095	0.00465	-0.00067	-0.0121	0.00650	-0.00114
	8.0	-0.0092	0.00455	-0.00059	-0.0118	0.00640	-0.00101
	9.0	-0.0094	0.00445	-0.00050	-0.0118	0.00630	-0.00089
	10.0	-0.0091	0.00437	-0.00044	-0.0117	0.00620	-0.00075
	12.0	-0.0088	0.00415	-0.00034	-0.0114	0.00602	-0.00058
	14.0	-0.0085	0.00384	-0.00024	-0.0112	0.00576	-0.00042
	16.0	-0.0083	0.00334	-0.00019	-0.0109	0.00541	-0.00032
0.93	-4.0	-0.0110	0.00543	-0.00195	-0.0136	0.00737	-0.00293
	-2.0	-0.0108	0.00530	-0.00168	-0.0133	0.00725	-0.00259
	0	-0.0104	0.00515	-0.00143	-0.0131	0.00704	-0.00224
	2.0	-0.0099	0.00486	-0.00120	-0.0128	0.00683	-0.00190
	4.0	-0.0099	0.00487	-0.00099	-0.0126	0.00679	-0.00161
	6.0	-0.0098	0.00481	-0.00081	-0.0124	0.00670	-0.00130
	7.0	-0.0097	0.00478	-0.00069	-0.0124	0.00664	-0.00116
	8.0	-0.0095	0.00467	-0.00060	-0.0124	0.00655	-0.00103
	9.0	-0.0095	0.00461	-0.00052	-0.0120	0.00643	-0.00090
	10.0	-0.0096	0.00449	-0.00045	-0.0120	0.00634	-0.00079
	12.0	-0.0091	0.00426	-0.00034	-0.0118	0.00616	-0.00060
0.95	-4.0	-0.0114	0.00566	-0.00198	-0.0146	0.00757	-0.00299
	-2.0	-0.0110	0.00541	-0.00170	-0.0143	0.00740	-0.00261
	0	-0.0106	0.00526	-0.00146	-0.0139	0.00720	-0.00225
	2.0	-0.0101	0.00497	-0.00118	-0.0136	0.00703	-0.00192
	4.0	-0.0103	0.00500	-0.00098	-0.0135	0.00700	-0.00161
	6.0	-0.0101	0.00498	-0.00079	-0.0132	0.00689	-0.00130
	7.0	-0.0100	0.00491	-0.00070	-0.0132	0.00685	-0.00117
	8.0	-0.0098	0.00482	-0.00060	-0.0131	0.00675	-0.00103
	9.0	-0.0099	0.00472	-0.00052	-0.0130	0.00662	-0.00091
	10.0	-0.0096	0.00464	-0.00045	-0.0130	0.00651	-0.00080

TABLE III.- LATERAL AND DIRECTIONAL STABILITY DATA - Concluded

(d) Fuselage alone

M	α_u	n = 10.9			n = 12.0		
		C_{Y_β}	C_{n_β}	C_{l_β}	C_{Y_β}	C_{n_β}	C_{l_β}
0.25	-4.0	-0.0007	-0.00104	0.00007	-0.0013	-0.00109	0
	-2.0	-0.0010	-0.00107	0.00007	-0.0015	-0.00112	0
	0	-0.0005	-0.00110	0.00003	-0.0010	-0.00117	-0.00005
	2.0	-0.0008	-0.00107	-0.00002	-0.0009	-0.00114	-0.00012
	4.0	-0.0003	-0.00101	-0.00007	-0.0013	-0.00111	-0.00013
	6.0	-0.0005	-0.00101	-0.00010	-0.0015	-0.00106	-0.00017
	7.0	-0.0010	-0.00101	-0.00012	-0.0019	-0.00101	-0.00019
	8.0	-0.0014	-0.00096	-0.00017	-0.0017	-0.00105	-0.00020
	9.0	-0.0012	-0.00097	-0.00019	-0.0020	-0.00098	-0.00019
	10.0	-0.0015	-0.00094	-0.00017	-0.0019	-0.00097	-0.00020
	12.0	-0.0012	-0.00091	-0.00019	-0.0021	-0.00094	-0.00022
	14.0	-0.0019	-0.00093	-0.00024	-0.0022	-0.00088	-0.00028
	16.0	-0.0021	-0.00080	-0.00026	-0.0030	-0.00073	-0.00024
	17.5	-0.0030	-0.00056	-0.00021	-0.0049	-0.00014	-0.00011
0.60	-4.0	-0.0018	-0.00111	0.00008	-0.0015	-0.00111	0.00010
	-2.0	-0.0017	-0.00111	0.00005	-0.0013	-0.00116	0.00005
	0	-0.0015	-0.00112	0.00002	-0.0013	-0.00114	0.00002
	2.0	-0.0017	-0.00111	-0.00003	-0.0013	-0.00114	-0.00002
	4.0	-0.0017	-0.00108	-0.00008	-0.0015	-0.00110	-0.00005
	6.0	-0.0019	-0.00105	-0.00012	-0.0015	-0.00105	-0.00008
	7.0	-0.0020	-0.00102	-0.00014	-0.0017	-0.00102	-0.00012
	8.0	-0.0019	-0.00102	-0.00015	-0.0019	-0.00101	-0.00012
	9.0	-0.0020	-0.00101	-0.00017	-0.0020	-0.00098	-0.00014
	10.0	-0.0022	-0.00099	-0.00017	-0.0019	-0.00099	-0.00015
	12.0	-0.0024	-0.00097	-0.00021	-0.0021	-0.00096	-0.00019
	14.0	-0.0028	-0.00096	-0.00024	-0.0022	-0.00091	-0.00021
	16.0	-0.0035	-0.00086	-0.00024	-0.0035	-0.00064	-0.00016
	17.5	-0.0044	-0.00074	-0.00023	-0.0051	-0.00019	-0.00005
0.80	-4.0	-0.0015	-0.00110	0.00008	-0.0017	-0.00115	0.00008
	-2.0	-0.0013	-0.00111	0.00003	-0.0015	-0.00118	0.00004
	0	-0.0013	-0.00112	0.00002	-0.0013	-0.00119	0
	2.0	-0.0013	-0.00111	-0.00003	-0.0015	-0.00118	-0.00005
	4.0	-0.0013	-0.00108	-0.00009	-0.0015	-0.00113	-0.00007
	6.0	-0.0017	-0.00103	-0.00010	-0.0017	-0.00110	-0.00012
	7.0	-0.0019	-0.00102	-0.00012	-0.0017	-0.00105	-0.00014
	8.0	-0.0019	-0.00102	-0.00014	-0.0019	-0.00102	-0.00015
	9.0	-0.0019	-0.00101	-0.00015	-0.0020	-0.00101	-0.00017
	10.0	-0.0020	-0.00101	-0.00017	-0.0022	-0.00099	-0.00019
	12.0	-0.0021	-0.00102	-0.00021	-0.0024	-0.00102	-0.00022
	14.0	-0.0026	-0.00102	-0.00024	-0.0026	-0.00099	-0.00026
	16.0	-0.0031	-0.00098	-0.00026	-0.0035	-0.00084	-0.00023
	17.5	-0.0035	-0.00094	-0.00028	-0.0044	-0.00056	-0.00018
0.90	-4.0	-0.0013	-0.00115	0.00008	-0.0018	-0.00120	0.00010
	-2.0	-0.0012	-0.00116	0.00005	-0.0017	-0.00121	0.00005
	0	-0.0013	-0.00117	0.00002	-0.0015	-0.00122	0
	2.0	-0.0013	-0.00116	-0.00002	-0.0017	-0.00121	-0.00003
	4.0	-0.0013	-0.00113	-0.00007	-0.0018	-0.00118	-0.00007
	6.0	-0.0015	-0.00110	-0.00010	-0.0020	-0.00112	-0.00011
	7.0	-0.0015	-0.00109	-0.00012	-0.0020	-0.00109	-0.00014
	8.0	-0.0017	-0.00106	-0.00012	-0.0024	-0.00107	-0.00015
	9.0	-0.0017	-0.00104	-0.00014	-0.0024	-0.00106	-0.00017
	10.0	-0.0019	-0.00104	-0.00015	-0.0024	-0.00104	-0.00019
	12.0	-0.0021	-0.00103	-0.00021	-0.0026	-0.00103	-0.00024
	14.0	-0.0024	-0.00108	-0.00024	-0.0029	-0.00106	-0.00026
	16.0	-0.0030	-0.00100	-0.00026	-0.0035	-0.00093	-0.00028
0.93	-4.0	-0.0017	-0.00118	0.00008	-0.0015	-0.00118	0.00008
	-2.0	-0.0015	-0.00121	0.00005	-0.0013	-0.00123	0.00005
	0	-0.0013	-0.00119	0	-0.0012	-0.00122	0
	2.0	-0.0015	-0.00119	-0.00003	-0.0013	-0.00123	-0.00005
	4.0	-0.0015	-0.00116	-0.00007	-0.0015	-0.00118	-0.00008
	6.0	-0.0017	-0.00113	-0.00010	-0.0017	-0.00112	-0.00012
	7.0	-0.0019	-0.00110	-0.00012	-0.0017	-0.00109	-0.00014
	8.0	-0.0019	-0.00111	-0.00014	-0.0019	-0.00107	-0.00015
	9.0	-0.0020	-0.00109	-0.00015	-0.0020	-0.00106	-0.00017
	10.0	-0.0022	-0.00110	-0.00017	-0.0022	-0.00106	-0.00019
	12.0	-0.0024	-0.00110	-0.00021	-0.0022	-0.00107	-0.00022
0.95	-4.0	-0.0013	-0.00115	0.00007	-0.0017	-0.00118	0.00007
	-2.0	-0.0012	-0.00118	0.00003	-0.0015	-0.00124	0.00003
	0	-0.0012	-0.00117	0	-0.0015	-0.00124	0
	2.0	-0.0012	-0.00116	-0.00003	-0.0015	-0.00123	-0.00005
	4.0	-0.0012	-0.00115	-0.00007	-0.0017	-0.00118	-0.00008
	6.0	-0.0013	-0.00112	-0.00012	-0.0019	-0.00112	-0.00013
	7.0	-0.0015	-0.00109	-0.00014	-0.0020	-0.00110	-0.00015
	8.0	-0.0017	-0.00109	-0.00015	-0.0022	-0.00109	-0.00017
	9.0	-0.0017	-0.00104	-0.00015	-0.0022	-0.00106	-0.00017
	10.0	-0.0019	-0.00106	-0.00019	-0.0022	-0.00106	-0.00020

TABLE IV.- RUDDER EFFECTIVENESS DATA

(a) Mid-wing, $\alpha_u \approx 6.3^\circ$

M	β	$S_v/S_w = 0.203$, $l_v/b_w = 0.620$, $\delta_r = 0°$				
		C_L	C_m	C_Y	C_n	C_l
0.25	-10.0	0.313	0.0060	0.072	-0.0464	0.0122
	-8.0	0.314	0.0067	0.067	-0.0381	0.0107
	-6.0	0.316	0.0075	0.042	-0.0265	0.0081
	-4.0	0.317	0.0091	0.024	— —	— —
	-2.0	0.314	0.0098	0.016	-0.0072	0.0023
	0	0.306	0.0111	0.009	0.0035	-0.0006
	2.0	0.312	0.0105	-0.006	0.0107	0.0055
	4.0	0.309	0.0087	-0.045	0.0232	-0.0066
	6.0	0.307	0.0078	-0.056	0.3460	-0.0093
	8.0	0.307	0.0073	— —	0.0491	-0.0118
	10.0	0.309	0.0063	-0.108	0.0565	-0.0140
	12.0	0.307	0.0054	-0.141	0.0648	-0.0155
	14.0	0.305	0.0040	-0.172	0.0742	-0.0169
	16.0	0.294	0.0022	-0.182	0.0815	-0.0184
	17.5	0.287	0.0016	-0.202	0.0865	-0.0187
0.80	-10.0	0.376	0.0140	0.112	-0.0530	0.0109
	-8.0	0.382	0.0122	0.093	-0.0467	0.0095
	-6.0	0.383	0.0129	0.068	-0.0323	0.0070
	-4.0	0.387	0.0132	0.046	-0.0200	0.0045
	-2.0	0.380	0.0133	0.023	-0.0083	0.0016
	0	0.387	0.0138	0.002	0.0018	-0.0008
	2.0	0.386	0.0134	-0.022	0.0120	-0.0034
	4.0	0.373	0.0129	-0.043	0.0233	-0.0062
	6.0	0.370	0.0122	-0.069	0.0372	-0.0087
	8.0	0.376	0.0127	-0.091	0.0488	-0.0109
	10.0	0.363	0.0137	-0.112	0.0568	-0.0127
	12.0	0.358	0.0129	-0.136	0.0672	-0.0151
	14.0	0.357	0.0113	-0.156	0.0739	-0.0169
	16.0	0.348	0.0066	-0.179	0.0805	-0.0186
	17.5	0.337	0.0044	-0.201	0.0854	-0.0195
0.90	-10.0	0.412	0.0123	0.111	-0.0540	0.0119
	-8.0	0.412	0.0116	0.091	-0.0461	0.0093
	-6.0	0.416	0.0126	0.067	-0.0340	0.0071
	-4.0	0.403	0.0143	0.045	-0.0208	0.0045
	-2.0	0.414	0.0155	0.021	-0.0091	0.0019
	0	0.409	0.0174	-0.001	0.0015	-0.0005
	2.0	0.403	0.0158	-0.026	0.0127	-0.0035
	4.0	0.406	0.0144	-0.046	0.0238	-0.0064
	6.0	0.415	0.0121	-0.074	0.0376	-0.0088
	8.0	0.414	0.0110	-0.097	0.0485	-0.0111
	10.0	0.398	0.0100	-0.112	0.0577	-0.0147
	12.0	0.393	0.0145	-0.137	0.0667	-0.0172
	14.0	0.392	0.0156	-0.156	0.0739	-0.0196
0.95	-10.0	0.450	-0.0035	0.119	-0.0582	0.0189
	-8.0	0.460	-0.0058	0.099	-0.0493	0.0145
	-6.0	0.454	0.0082	0.071	-0.0339	0.0071
	-4.0	0.436	0.0059	0.039	-0.0188	0.0040
	-2.0	0.450	0.0037	0.020	-0.0099	0.0011
	0	0.458	0.0039	-0.006	0.0022	-0.0006
	2.0	0.452	0.0064	-0.019	0.0144	-0.0029
	4.0	0.443	0.0066	-0.048	0.0242	-0.0059
	6.0	0.459	0	-0.074	0.0388	-0.0112
	8.0	0.476	-0.0073	-0.105	0.0523	-0.0154
	10.0	0.472	-0.0022	-0.122	0.0590	-0.0195
	12.0	0.464	0.0062	-0.139	0.0667	-0.0211
	14.0	0.446	0.0099	-0.171	0.0756	-0.0233

TABLE IV.- RUDDER EFFECTIVENESS DATA - Continued
(a) Mid-wing, $\alpha_u \approx 6.3^\circ$ - Concluded

M	β	S_v/S_w = 0.203 , l_v/b_w = 0.620 , δ_r = 10°				
		C_L	C_m	C_Y	C_n	C_l
0.25	-10.0	0.311	0.0081	0.094	-0.0625	0.0142
	-8.0	0.304	0.0084	0.096	-0.0546	0.0123
	-6.0	0.318	0.0097	0.073	-0.0425	0.0097
	-4.0	0.319	0.0103	0.046	-0.0300	0.0065
	-2.0	0.307	0.0119	0.026	-0.0187	0.0035
	0	0.317	0.0119	0.013	-0.0110	0.0011
	2.0	0.312	0.0118	-0.009	-0.0017	-0.0015
	4.0	0.313	0.0100	-0.017	0.0079	-0.0042
	6.0	0.309	0.0950	-0.046	0.0212	-0.0073
	8.0	0.307	0.0082	-0.065	0.0338	-0.0097
	10.0	0.318	0.0068	-0.089	0.0449	-0.0122
	12.0	0.307	0.0054	-0.100	0.0563	-0.0143
	14.0	0.310	0.0040	-0.122	0.0644	-0.0157
	16.0	0.303	0.0023	-0.157	0.0727	-0.0171
	17.5	0.295	0.0063	-0.183	0.0788	-0.0176
0.80	-10.0	0.413	0.0170	0.119	-0.0631	0.0122
	-8.0	0.379	0.0141	0.107	-0.0609	0.0115
	-6.0	0.386	0.0150	0.084	-0.0474	0.0089
	-4.0	0.388	0.0150	0.062	-0.0352	0.0062
	-2.0	0.388	0.0146	0.039	-0.0240	0.0034
	0	0.386	0.0150	0.022	-0.0147	0.0010
	2.0	0.383	0.0151	-0.002	-0.0037	-0.0019
	4.0	0.386	0.0138	-0.030	0.0084	-0.0047
	6.0	0.387	0.0130	-0.057	0.0227	-0.0074
	8.0	0.381	0.0129	-0.082	0.0356	-0.0097
	10.0	0.374	0.0130	-0.103	0.0461	-0.0118
	12.0	0.367	0.0118	-0.128	0.0571	-0.0141
	14.0	0.358	0.0097	-0.150	0.0648	-0.0159
	16.0	0.348	0.0051	-0.172	0.0717	-0.0177
	17.5	0.335	0.0024	-0.193	0.0760	-0.0186
0.90	-10.0	0.415	0.0152	0.120	-0.0662	0.0131
	-8.0	0.417	0.0143	0.107	-0.0614	0.0113
	-6.0	0.422	0.0162	0.084	-0.0493	0.0088
	-4.0	0.420	0.0176	0.061	-0.0364	0.0062
	-2.0	0.417	0.0179	0.041	-0.0250	0.0037
	0	0.415	0.0195	0.020	-0.0150	0.0011
	2.0	0.414	0.0181	-0.006	-0.0036	-0.0018
	4.0	0.417	0.0151	-0.028	0.0092	-0.0048
	6.0	0.421	0.0119	-0.055	0.0234	-0.0073
	8.0	0.420	0.0111	-0.080	0.0348	-0.0104
	10.0	0.420	0.0088	-0.100	0.0452	-0.0138
	12.0	0.412	0.0123	-0.124	0.0557	-0.0165
	14.0	0.400	0.0143	-0.148	0.0632	-0.0190
0.95	-10.0	0.484	-0.0008	0.135	-0.0761	0.0198
	-8.0	0.474	0.0081	0.115	-0.0646	0.0137
	-6.0	0.467	0.0100	0.090	-0.0499	0.0085
	-4.0	0.469	0.0067	0.066	-0.0369	0.0055
	-2.0	0.471	0.0034	0.045	-0.0262	0.0027
	0	0.471	0.0026	0.018	-0.0143	0.0017
	2.0	0.464	0.0045	-0.008	-0.0013	-0.0009
	4.0	0.463	0.0053	-0.031	0.0104	-0.0044
	6.0	0.476	-0.0028	-0.058	0.0246	-0.0097
	8.0	0.477	0.0037	-0.086	0.0377	-0.0128
	10.0	0.481	-0.0031	-0.104	0.0454	-0.0163
	12.0	0.473	0.0033	-0.130	0.0577	-0.0215
	14.0	0.462	0.0091	-0.154	0.0668	-0.0233

[redacted]

TABLE IV.- RUDDER EFFECTIVENESS DATA - Continued

(b) High Wing, $\alpha_u \approx 6.3^{\circ}$

M	β	$S_v/S_w = 0.203$, $l_v/b_w = 0.620$					
		$\delta_r = 0°$			$\delta_r = 10°$		
		C_Y	C_n	C_l	C_Y	C_n	C_l
0.25	-10.0	0.117	-0.0432	0.0171	0.135	-0.0580	0.0186
	-8.0	0.096	-0.0339	0.0136	0.109	-0.0482	0.0146
	-6.0	0.071	-0.0235	0.0097	0.083	-0.0384	0.0110
	-4.0	0.046	-0.0146	0.0066	0.062	-0.0290	0.0076
	-2.0	0.023	-0.0050	0.0026	0.041	-0.0209	0.0041
	0	0.003	0.0030	-0.0007	0.022	-0.0138	0.0008
	2.0	-0.028	0.0100	-0.0040	0	-0.0055	-0.0025
	4.0	-0.049	0.0188	-0.0074	-0.020	0.0030	-0.0060
	6.0	-0.075	0.0285	-0.0113	-0.045	0.0135	-0.0094
	8.0	-0.100	0.0392	-0.0151	-0.076	0.0253	-0.0130
	10.0	-0.124	0.0485	-0.0188	-0.103	0.0356	-0.0167
	12.0	-0.147	0.0570	-0.0224	-0.129	0.0447	-0.0203
	14.0	-0.173	0.0655	-0.0272	-0.152	0.0542	-0.0248
	16.0	-0.192	0.0728	-0.0312	-0.178	0.0627	-0.0295
	17.5	-0.206	0.0791	-0.0349	-0.189	0.0671	-0.0318
0.80	-10.0	0.120	-0.0450	0.0160	0.134	-0.0581	0.0167
	-8.0	0.097	-0.0380	0.0128	0.120	-0.0564	0.0146
	-6.0	0.070	-0.0268	0.0089	0.089	-0.0435	0.0108
	-4.0	0.045	-0.0159	0.0055	0.065	-0.0331	0.0073
	-2.0	0.021	-0.0061	0.0022	0.041	-0.0225	0.0039
	0	-0.003	0.0023	0.0010	0.020	-0.0148	0.0009
	2.0	-0.026	0.0105	-0.0041	-0.003	-0.0057	-0.0025
	4.0	-0.044	0.0213	-0.0076	-0.031	0.0042	-0.0057
	6.0	-0.079	0.0324	-0.0111	-0.062	0.0171	-0.0094
	8.0	-0.102	0.0422	-0.0144	-0.089	0.0281	-0.0129
	10.0	-0.122	0.0490	-0.0176	-0.114	0.0369	-0.0164
	12.0	-0.144	0.0550	-0.0217	-0.137	0.0458	-0.0204
	14.0	-0.169	0.0651	-0.0257	-0.162	0.0540	-0.0249
	16.0	-0.194	0.0709	-0.0300	-0.186	0.0602	-0.0290
	17.5	-0.212	0.0736	-0.0338	-0.204	0.0640	-0.0327
0.90	-10.0	0.124	-0.0468	0.0158	0.135	-0.0600	0.0170
	-8.0	0.098	-0.0385	0.0119	0.113	-0.0528	0.0136
	-6.0	0.076	-0.0297	0.0087	0.090	-0.0433	0.0106
	-4.0	0.050	-0.0184	0.0056	0.064	-0.0334	0.0077
	-2.0	0.024	0.0074	0.0025	0.040	-0.0229	0.0045
	0	-0.002	0.0022	-0.0009	0.019	-0.0144	0.0013
	2.0	-0.026	0.0111	-0.0044	-0.005	-0.0049	-0.0023
	4.0	-0.054	0.0232	-0.0078	-0.035	0.0066	-0.0057
	6.0	-0.080	0.0332	-0.0110	-0.064	0.0193	-0.0091
	8.0	-0.104	0.0430	-0.0147	-0.092	0.0303	-0.0131
	10.0	-0.123	0.0492	-0.0183	-0.114	0.0369	-0.0122
	12.0	-0.146	0.0564	-0.0232	-0.138	0.0454	-0.0218
	14.0	-0.168	0.0629	-0.0301	-0.161	0.0526	-0.0290
0.95	-10.0	0.128	-0.0490	0.0235	0.143	-0.0652	0.0254
	-8.0	0.105	-0.0401	0.0136	0.119	-0.0549	0.0148
	-6.0	0.078	-0.0293	0.0088	0.094	-0.0451	0.0106
	-4.0	0.050	-0.0179	0.0050	0.069	-0.0343	0.0066
	-2.0	0.026	-0.0088	0.0016	0.044	-0.0244	0.0035
	0	-0.003	0.0022	-0.0003	0.019	-0.0146	0.0015
	2.0	-0.026	0.0114	-0.0036	-0.006	-0.0042	-0.0016
	4.0	-0.054	0.0228	-0.0109	-0.036	0.0081	-0.0058
	6.0	-0.079	0.0337	-0.0124	-0.064	0.0193	-0.0106
	8.0	-0.103	0.0434	-0.0193	-0.090	0.0296	-0.0172
	10.0	-0.124	0.0514	-0.0269	-0.130	0.0367	-0.0243
	12.0	-0.147	0.0574	-0.0319	-0.136	0.0452	-0.0308
	14.0	-0.174	0.0650	-0.0373	-0.164	0.0538	-0.0368

[redacted]

TABLE IV.- RUDDER EFFECTIVENESS DATA - Continued

(b) High Wing, $\alpha_u \approx 6.3^\circ$ - Concluded

M	β	$S_v/S_w = 0.267$, $l_v/b_w = 0.443$					
		$\delta_r = 0^\circ$			$\delta_r = 10^\circ$		
		C_Y	C_n	C_l	C_Y	C_n	C_l
0.25	-10.0	0.144	-0.0438	0.0223	0.175	-0.0595	0.0255
	-8.0	0.112	-0.0341	0.0179	0.146	-0.0513	0.0212
	-6.0	0.086	-0.0243	0.0132	0.111	-0.0403	0.0159
	-4.0	0.046	-0.0134	0.0075	0.081	-0.0308	0.0115
	-2.0	0.022	-0.0061	0.0032	0.057	-0.0219	0.0067
	0	-0.006	0.0007	-0.0007	0.025	-0.0144	0.0025
	2.0	-0.031	0.0090	-0.0054	-0.003	-0.0067	-0.0018
	4.0	-0.058	0.0174	-0.0092	-0.032	0.0030	-0.0066
	6.0	-0.087	0.0270	-0.0138	-0.061	0.0136	-0.0108
	8.0	-0.118	0.0376	-0.0186	-0.091	0.0244	-0.0160
	10.0	-0.144	0.0469	-0.0230	-0.126	0.0343	-0.0206
	12.0	-0.173	0.0543	-0.0273	-0.152	0.0430	-0.0250
	14.0	-0.199	0.0626	-0.0323	-0.185	0.0520	-0.0300
	16.0	-0.227	0.0699	-0.0371	-0.209	0.0606	-0.0351
	17.5	-0.247	0.0758	-0.0408	-0.231	0.0665	-0.0386
0.80	-10.0	0.152	-0.0463	0.0210	0.175	-0.0617	0.0241
	-8.0	0.121	-0.0380	0.0169	0.148	-0.0552	0.0210
	-6.0	0.092	-0.0285	0.0127	0.119	-0.0448	0.0164
	-4.0	0.059	-0.0171	0.0080	0.085	-0.0333	0.0115
	-2.0	0.027	-0.0076	0.0034	0.056	-0.0236	0.0070
	0	-0.004	0.0017	-0.0009	0.026	-0.0155	0.0028
	2.0	-0.032	0.0101	-0.0050	-0.004	-0.0067	-0.0014
	4.0	-0.063	0.0200	-0.0099	-0.036	0.0033	-0.0061
	6.0	-0.096	0.0319	-0.0146	-0.071	0.0159	-0.0110
	8.0	-0.127	0.0430	-0.0192	-0.104	0.0274	-0.0158
	10.0	-0.152	0.0477	-0.0235	-0.132	0.0352	-0.0198
	12.0	-0.179	0.0555	-0.0264	-0.162	0.0440	-0.0243
	14.0	-0.209	0.0633	-0.0313	-0.193	0.0521	-0.0291
	16.0	-0.237	0.0689	-0.0359	-0.221	0.0585	-0.0337
	17.5	-0.258	0.0718	-0.0399	-0.243	0.0624	-0.0378
0.90	-10.0	0.161	-0.0514	0.0216	0.187	-0.0681	0.0255
	-8.0	0.128	-0.0409	0.0166	0.152	-0.0563	0.0203
	-6.0	0.098	-0.0331	0.0124	0.120	-0.0458	0.0159
	-4.0	0.062	-0.0187	0.0078	0.088	-0.0347	0.0115
	-2.0	0.028	-0.0083	0.0035	0.058	-0.0249	0.0073
	0	-0.003	0.0017	-0.0007	0.030	-0.0165	0.0033
	2.0	-0.033	0.0109	-0.0050	-0.007	-0.0062	-0.0014
	4.0	-0.066	0.0223	-0.0098	-0.041	0.0055	-0.0071
	6.0	-0.099	0.0344	-0.0145	-0.078	0.0187	-0.0147
	8.0	-0.128	0.0444	-0.0192	-0.110	0.0301	-0.0221
	10.0	-0.157	0.0524	-0.0232	-0.138	0.0384	-0.0282
	12.0	-0.185	0.0580	-0.0276	-0.167	0.0455	-0.0343
	14.0	-0.213	0.0635	-0.0349	-0.198	0.0532	-0.0431
0.95	-10.0	0.163	-0.0525	0.0292	0.192	-0.0715	0.0337
	-8.0	0.132	-0.0419	0.0175	0.156	-0.0588	0.0212
	-6.0	0.100	-0.0305	0.0123	0.123	-0.0474	0.0156
	-4.0	0.065	-0.0187	0.0071	0.091	-0.0358	0.0109
	-2.0	0.034	-0.0095	0.0026	0.060	-0.0262	0.0064
	0	0.001	0.0009	-0.0007	0.027	-0.0165	0.0031
	2.0	-0.031	0.0114	-0.0048	-0.007	-0.0055	-0.0008
	4.0	-0.063	0.0224	-0.0099	-0.043	0.0071	-0.0062
	6.0	-0.094	0.0339	-0.0158	-0.075	0.0184	-0.0120
	8.0	-0.127	0.0455	-0.0233	-0.110	0.0312	-0.0201
	10.0	-0.158	0.0569	-0.0296	-0.144	0.0424	-0.0267
	12.0	-0.190	0.0667	-0.0363	-0.175	0.0517	-0.0358
	14.0	-0.213	0.0677	-0.0455	-0.201	0.0525	-0.0418

TABLE IV.- RUDDER EFFECTIVENESS DATA - Concluded

(c) Mid-wing, $\beta = 0^{\circ}$

M	α_u	$S_v/S_w = 0.267$, $l_v/b_w = 0.599$					
		$\delta_r = 0^{\circ}$			$\delta_r = 10^{\circ}$		
		C_Y	C_n	C_l	C_Y	C_n	C_l
0.25	-4.0	-0.016	0.0007	-0.0002	0.033	-0.0191	0.0052
	-2.0	-0.003	0.0007	0		-0.0164	0.0048
	0	-0.019	0.0006	0	0.038	-0.0184	0.0042
	2.0	-0.009	0.0010	-0.0001	0.026	-0.0179	0.0034
	4.0	-0.025	0.0007	0	0.038	-0.0173	0.0027
	6.0	-0.022	0.0008	-0.0001	0.026	-0.0180	0.0018
	8.0	-0.019	0.0006	-0.0001	0.009	-0.0183	0.0012
	10.0	-0.016	0.0003	-0.0003	0.038	-0.0178	0.0003
	12.0	0.003	0.0007	-0.0002	0.031	-0.0182	-0.0002
	14.0	-0.009	0.0002	-0.0001	0.044	-0.0184	-0.0006
	16.0	-0.006	0.0003	0.0001	0.047	-0.0184	-0.0013
	18.0	-0.006	0.0010	0.0002	0.038	-0.0185	-0.0020
	20.0	0.009	0.0022	0.0022	0.053	-0.0181	-0.0015
	22.0	0.016	0.0015	0.0081	0.065	-0.0202	0.0047
	24.0	0.031	0.0059	0.0141	0.079	-0.0208	0.0085
0.80	-4.0	-0.001	0.0007	-0.0001	0.020	-0.0221	0.0079
	-2.0	-0.001	0.0009	-0.0001	0.014	-0.0218	0.0069
	0	0	0.0010	-0.0001	0.024	-0.0216	0.0056
	2.0	0	0.0011	-0.0001	0.024	-0.0212	0.0045
	4.0	-0.001	0.0008	-0.0003	0.026	-0.0208	0.0034
	6.0	-0.001	0.0008	-0.0002	0.025	-0.0208	0.0026
	8.0	-0.002	0.0005	0.0001	0.024	-0.0210	0.0021
	10.0	-0.002	0.0004	0	0.019	-0.0213	0.0012
	12.0	0.003	0.0011	0.0001	0.020	-0.0218	0.0004
	14.0	0.003	0.0007	0.0001	0.026	-0.0226	-0.0005
	16.0	0.003	0.0011	0.0004	0.027	-0.0231	-0.0012
	18.0	0.005	0.0002	0.0010	0.029	-0.0241	-0.0020
	20.0	0.014	-0.0027	0.0050	0.036	-0.0284	-0.0003
	22.0	0.020	-0.0064	0.0058	0.039	-0.0283	0.0001
	24.0	0.035	-0.0053	0.0062	0.057	-0.0299	0.0010
0.90	-4.0	-0.003	0.0002	-0.0001	0.029	-0.0222	0.0079
	-2.0	-0.004	0.0002	0	0.032	-0.0220	0.0070
	0	-0.007	0.0002	-0.0001	0.030	-0.0218	0.0059
	2.0	-0.004	0.0004	-0.0001	0.029	-0.0212	0.0050
	4.0	-0.003	0.0002	-0.0002	0.029	-0.0210	0.0040
	6.0	-0.001	0.0004	0.0002	0.028	-0.0211	0.0037
	8.0	-0.001	0.0004	0.0002	0.027	-0.0212	0.0027
	10.0	-0.002	-0.0001	-0.0001	0.026	-0.0219	0.0014
	12.0	-0.001	-0.0001	0.0001	0.026	-0.0224	0.0009
	14.0	-0.004	-0.0003	0.0001	0.030	-0.0226	-0.0002
	16.0	0.001	-0.0003	0	0.033	-0.0231	-0.0014
0.95	-4.0	0.005	-0.0009	0.0003	0.029	-0.0226	0.0080
	-2.0	0.006	-0.0007	0.0001	0.037	-0.0218	0.0066
	0	0.002	-0.0008	-0.0002	0.037	-0.0221	0.0059
	2.0	-0.002	-0.0005	-0.0001	0.035	-0.0216	0.0049
	4.0	0.005	-0.0004	-0.0002	0.036	-0.0215	0.0040
	6.0	0.004	0.0002	-0.0002	0.035	-0.0213	0.0036
	8.0	0.004	-0.0001	-0.0007	0.037	-0.0212	0.0019
	10.0	0.006	-0.0006	-0.0003	0.031	-0.0169	0.0016

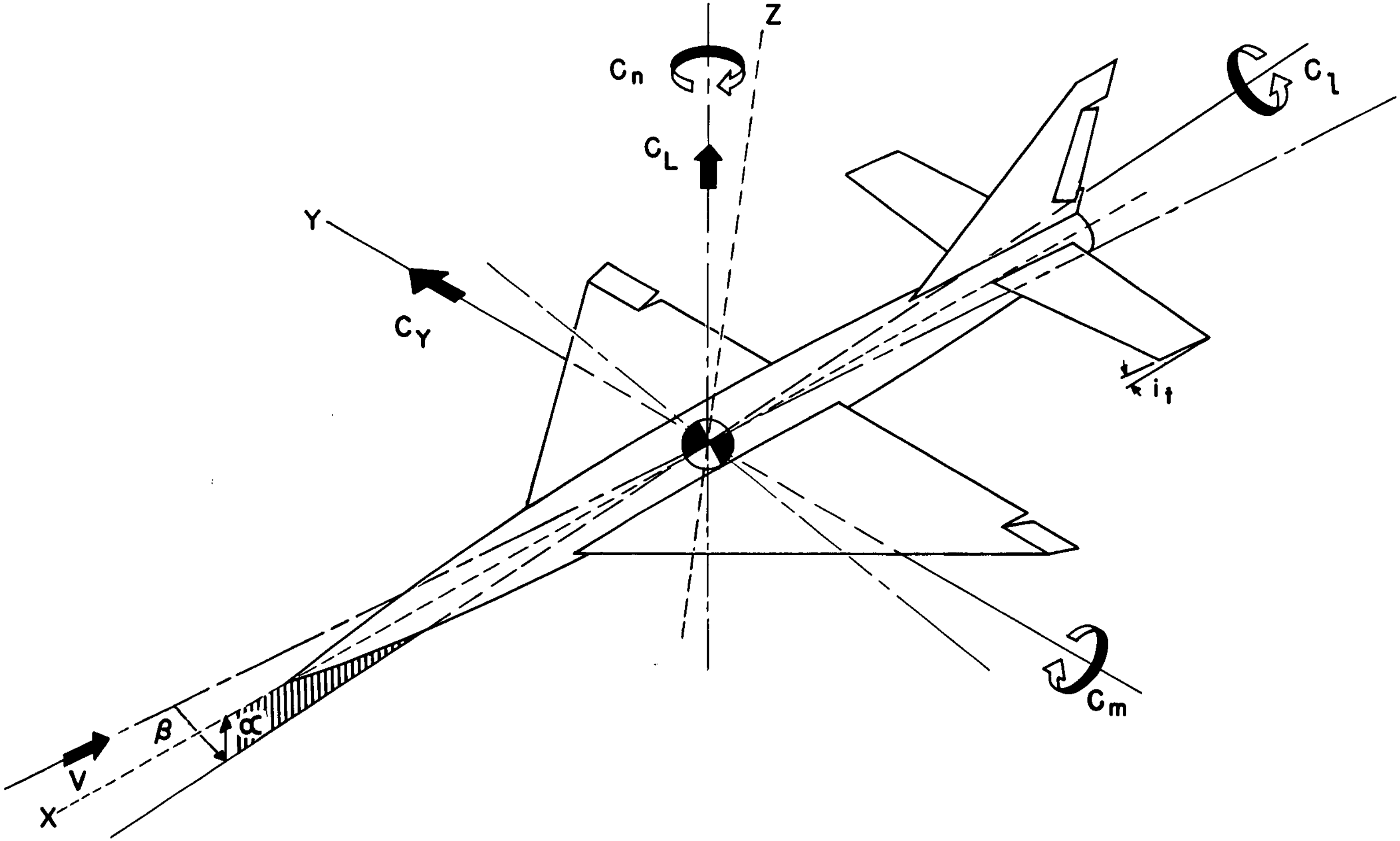


Figure 1.- The sign convention used in presentation of the data. All force and moment coefficients, angles, and control-surface deflections shown are positive.

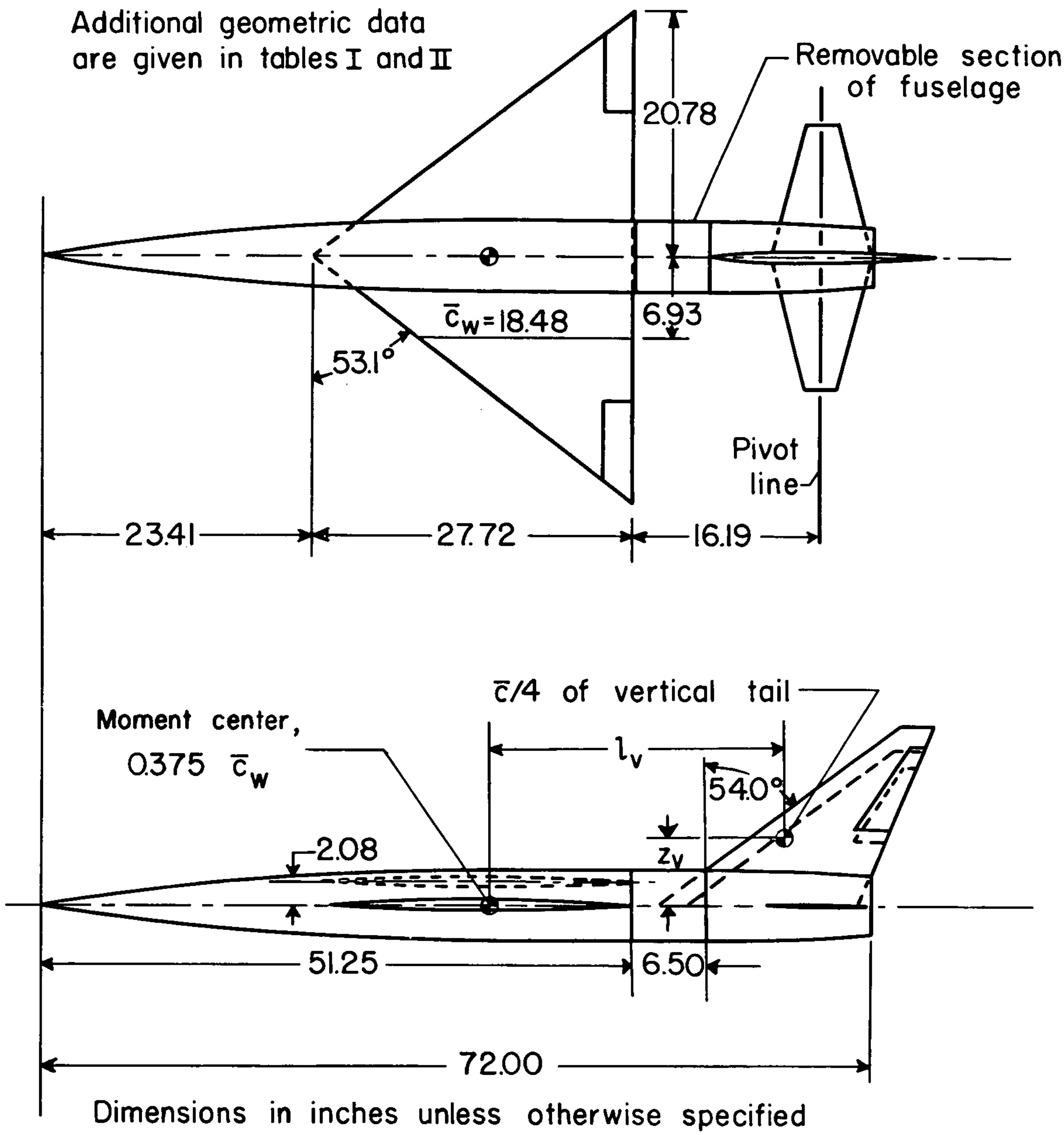


Figure 2.- Geometry of the model

A-19365

Figure 3.- Model mounted in the wind tunnel.

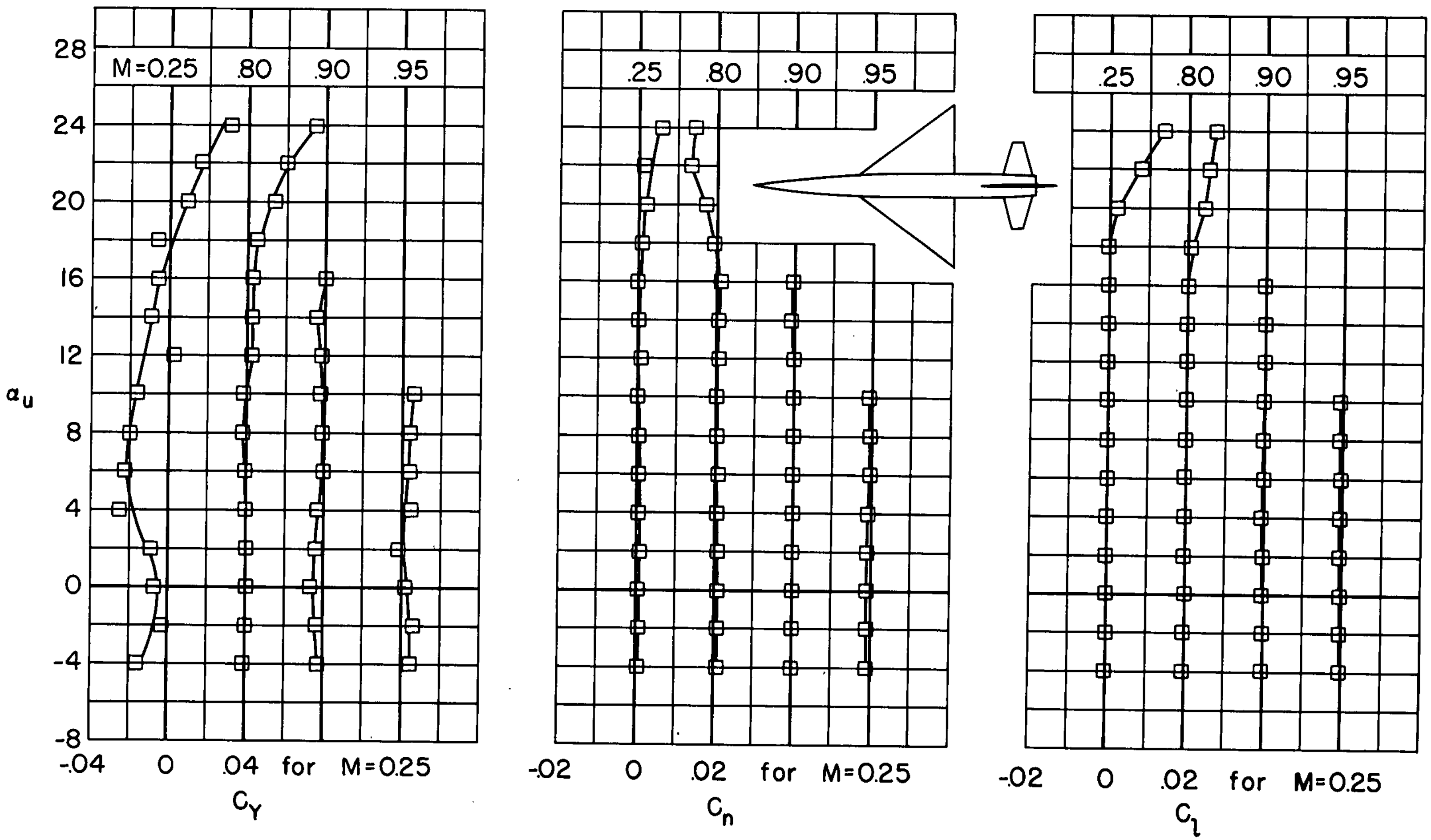
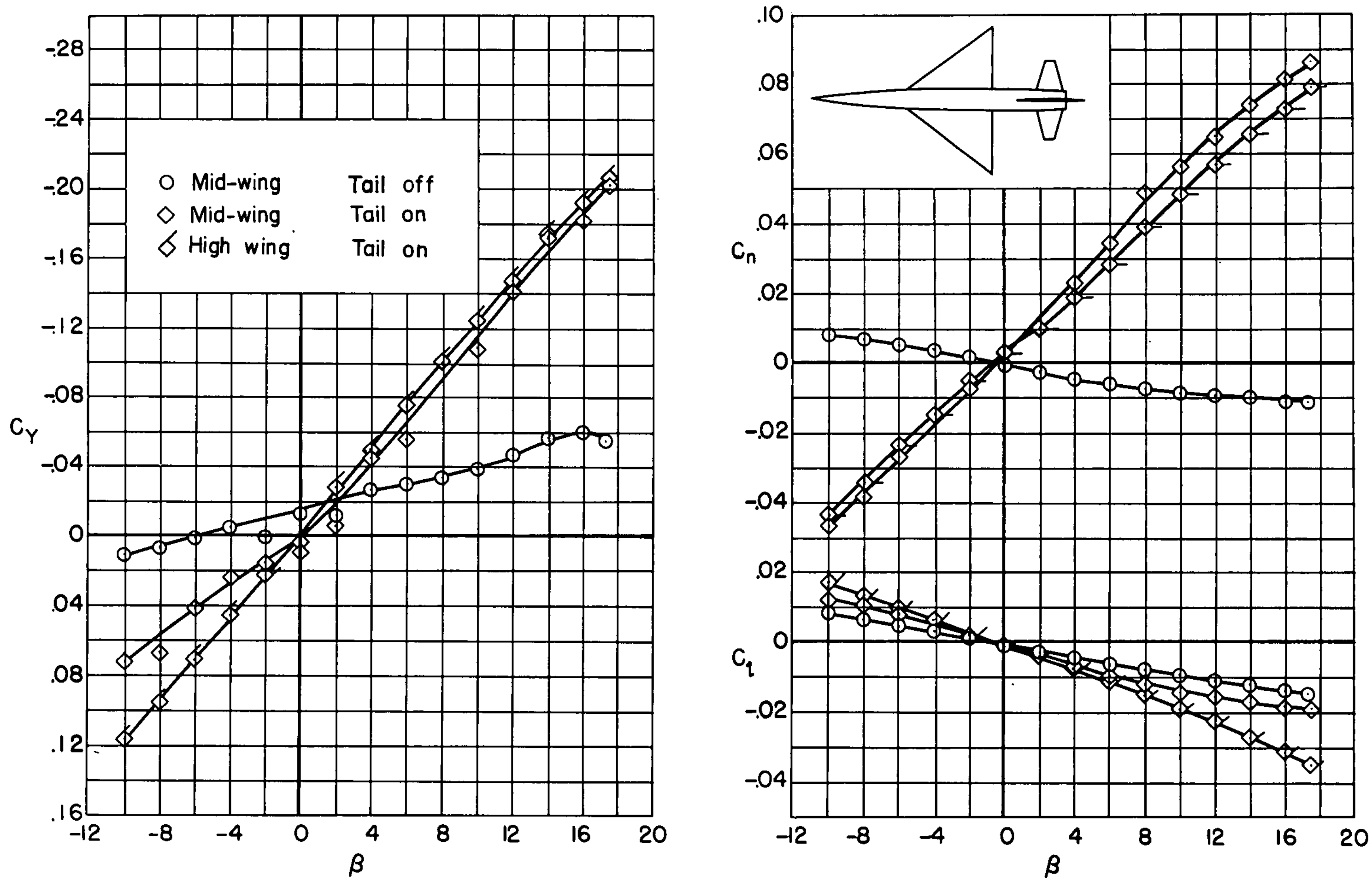
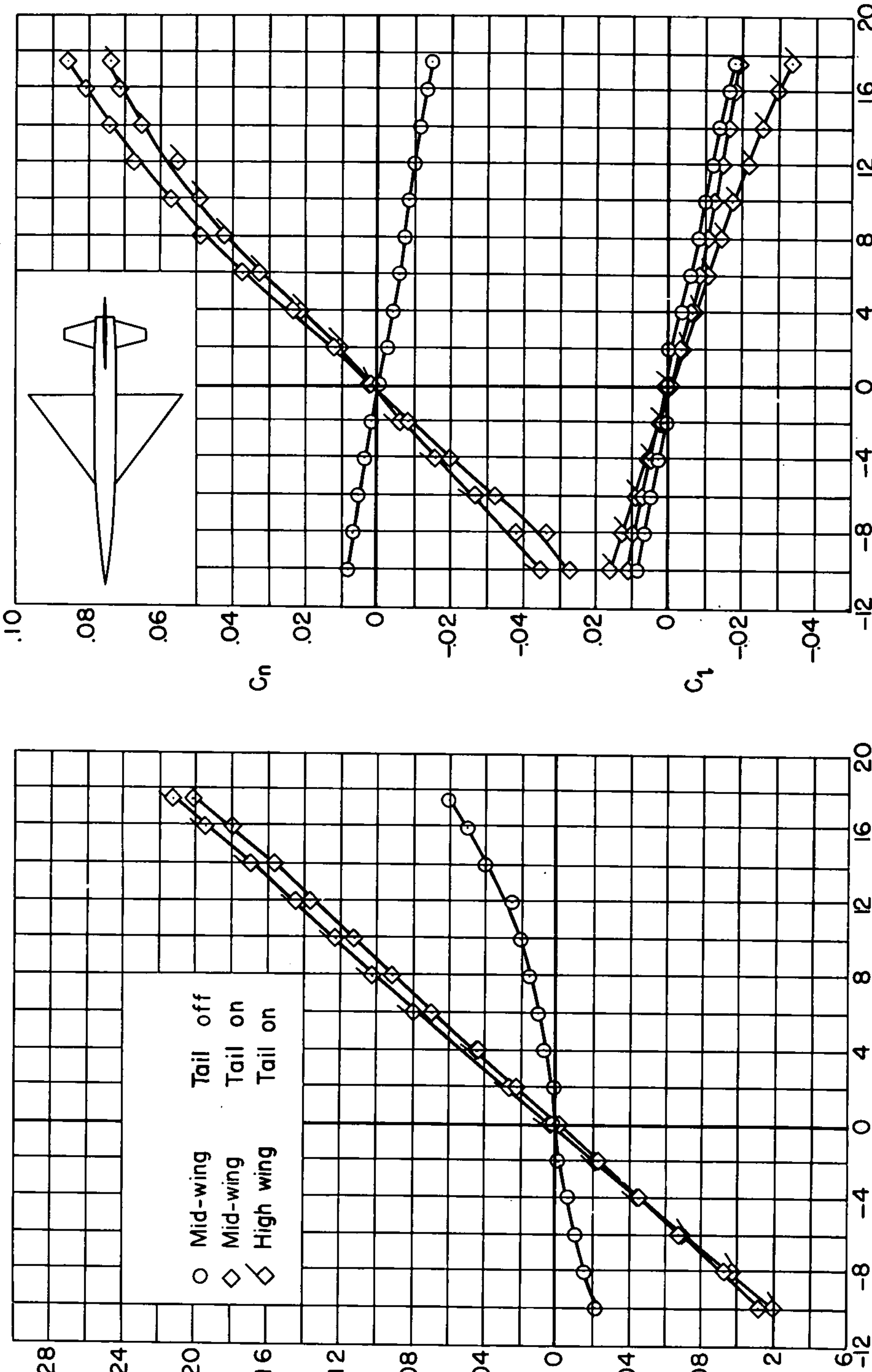


Figure 4.- The variation with angle of attack of the lateral-force, rolling-moment, and yawing-moment coefficients for the complete mid-wing model; $l_V/b_W = 0.599$, $S_V/S_W = 0.267$, $\beta = 0^{\circ}$.



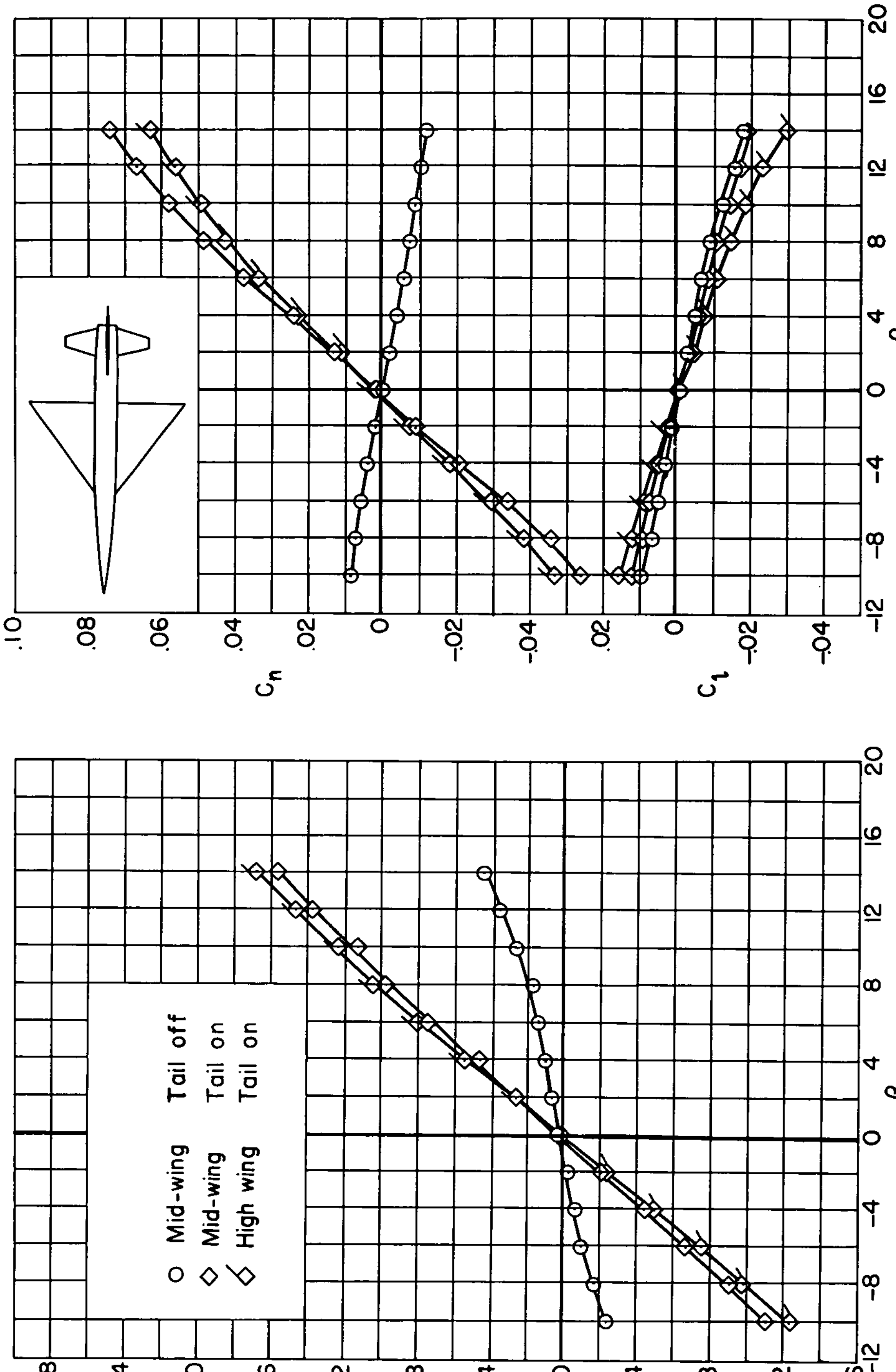
(a) M = 0.25

Figure 5.- The variation with angle of sideslip of the lateral-force, rolling-moment, and yawing-moment coefficients for several configurations; $l_V/b_W = 0.620$, $S_V/S_W = 0.203$, $\alpha_u \approx 6.3^{\circ}$.



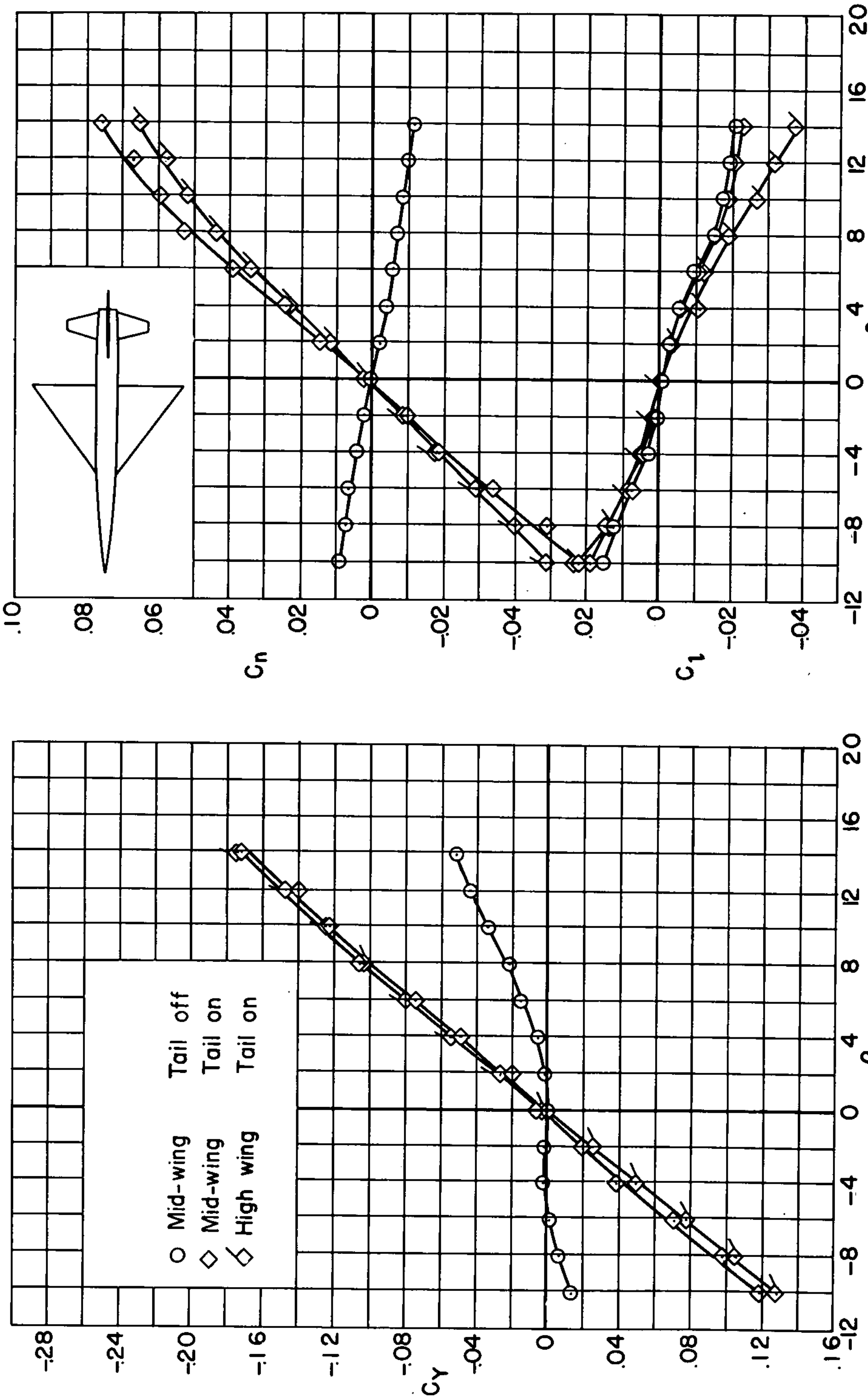
(b) M = 0.80

Figure 5.- Continued.



(c) M = 0.90

Figure 5.- Continued.



(d) M = 0.95

Figure 5.- Concluded.

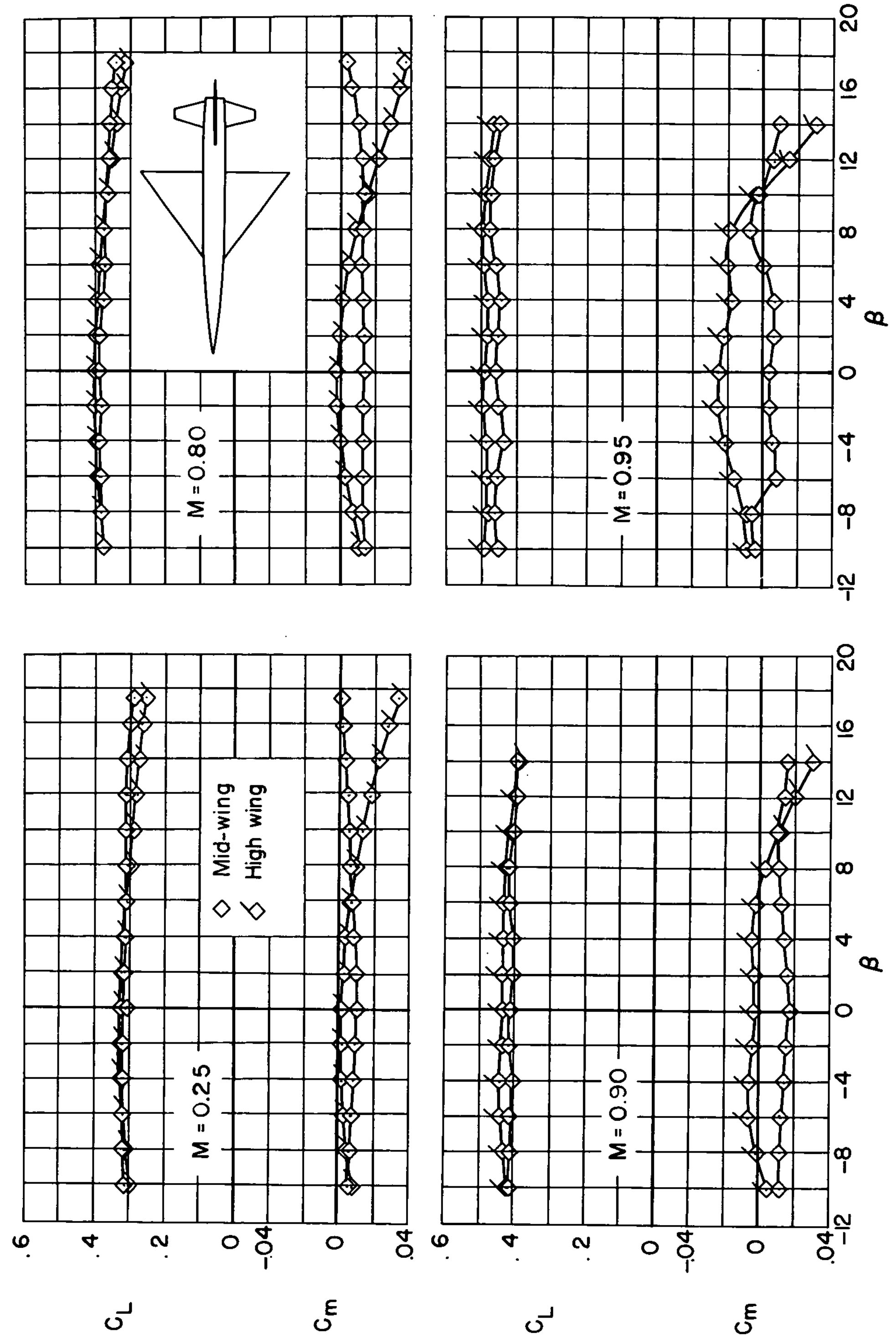
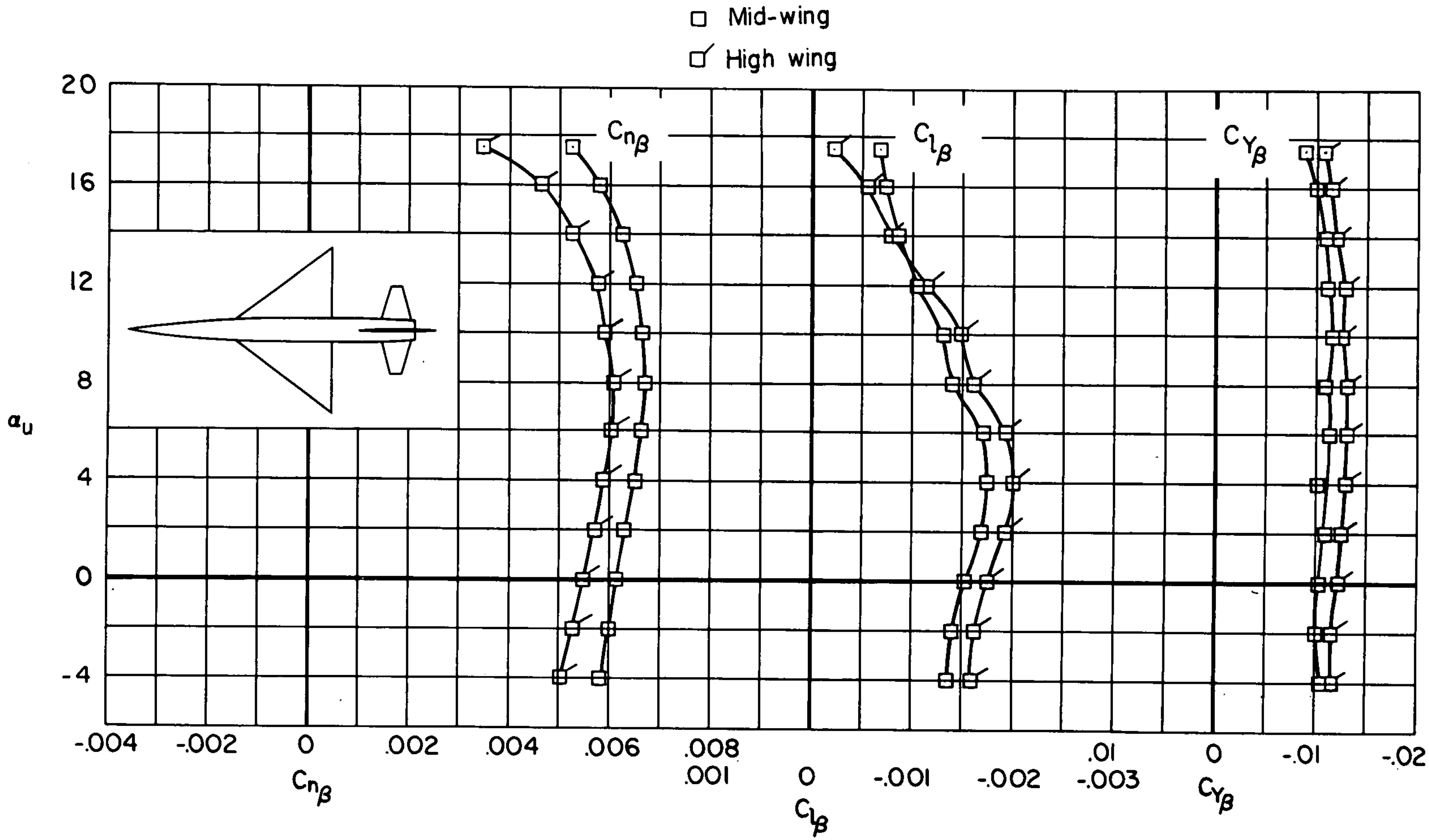
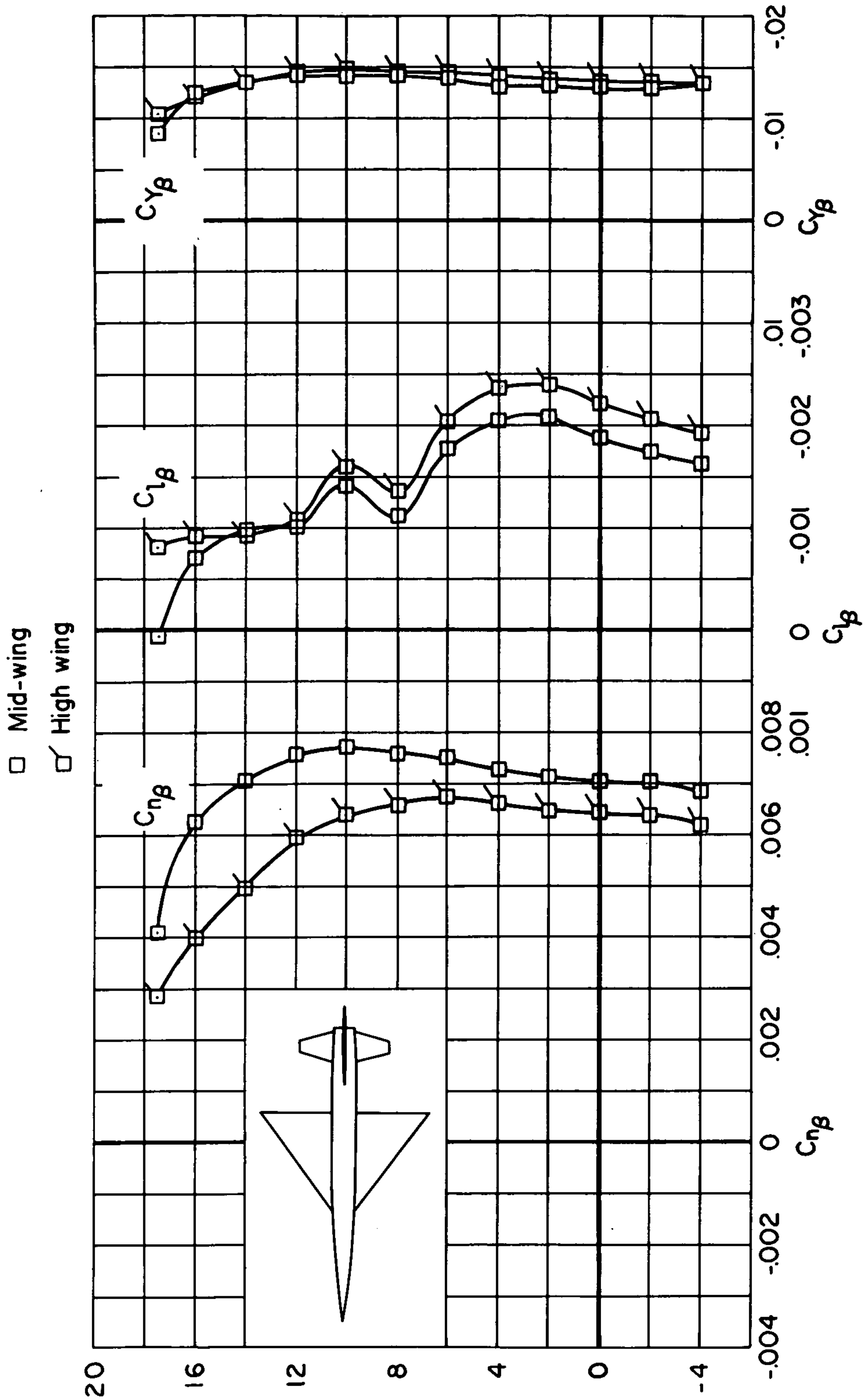


Figure 6.- The variation with angle of sideslip of the lift and pitching-moment coefficients for the complete model; $l_v/b_w = 0.620$, $S_v/S_w = 0.203$, $\alpha_u \approx 6.3^\circ$.



(a) $M = 0.25$

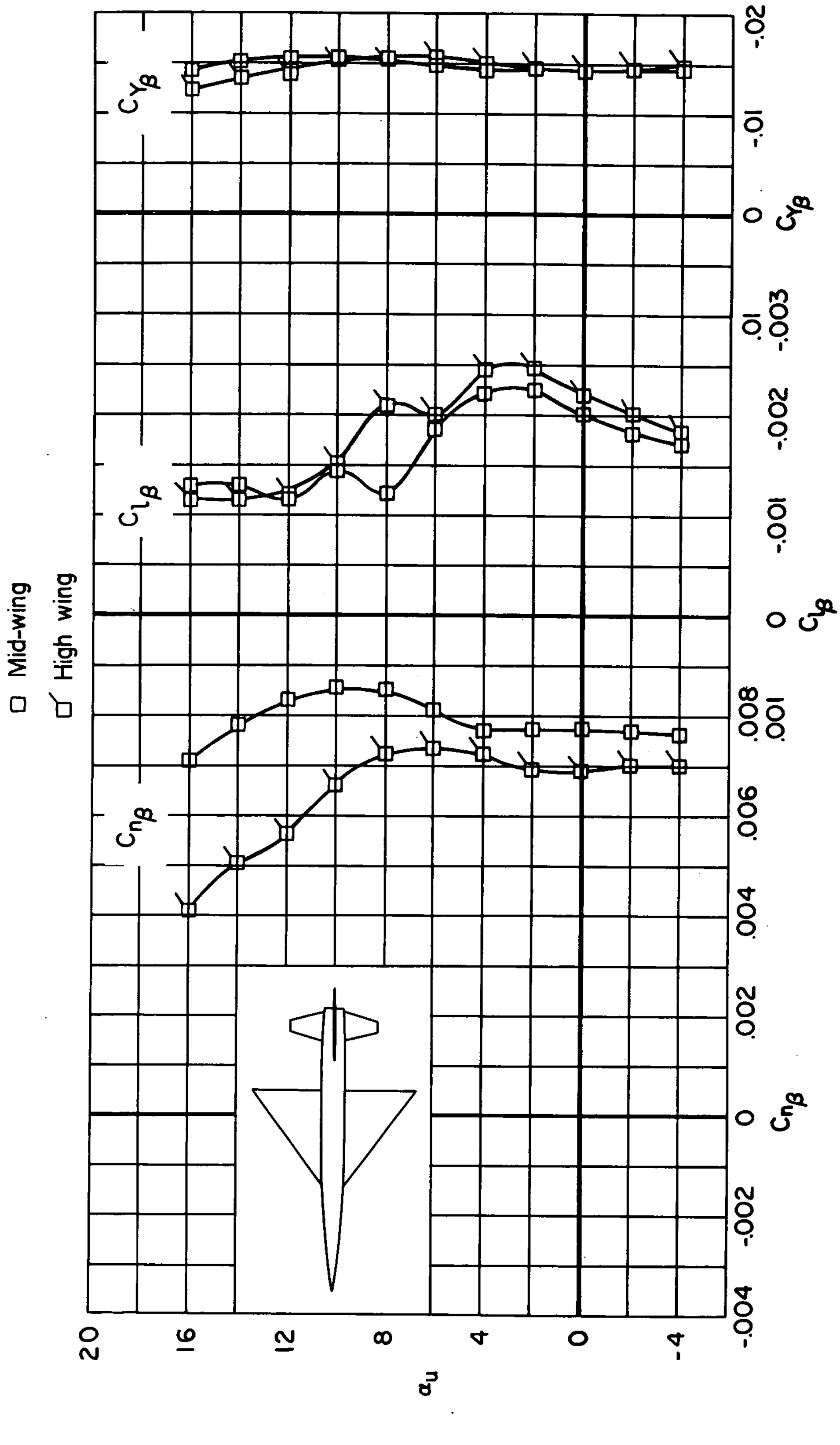
Figure 7.- The effect of wing height on the lateral and directional stability characteristics of the complete model; $l_V/b_W = 0.599$, $S_V/S_W = 0.267$.



(b) M = 0.80

Figure 7.- Continued.

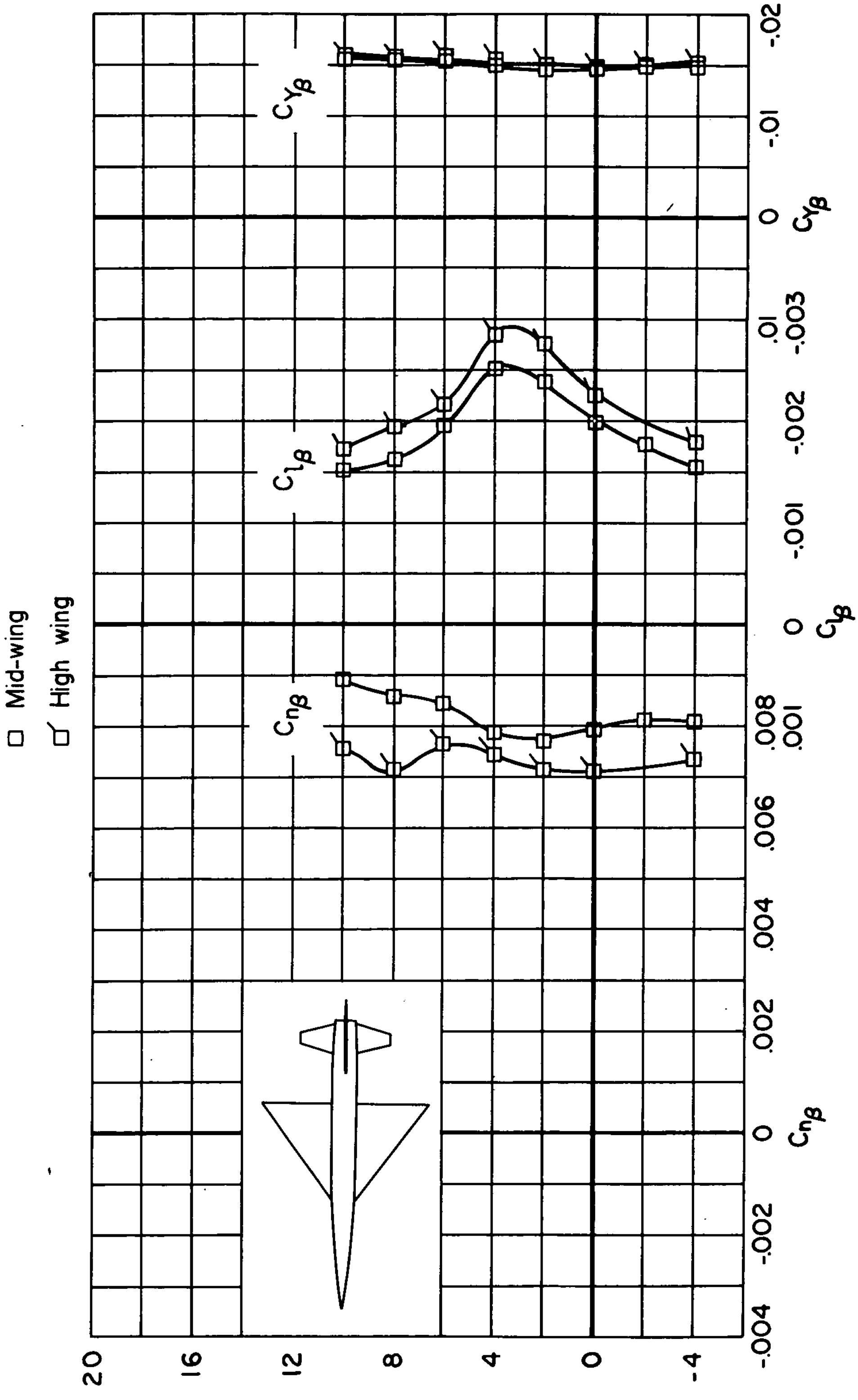
[redacted]



(c) M = 0.90

Figure 7.- Continued.

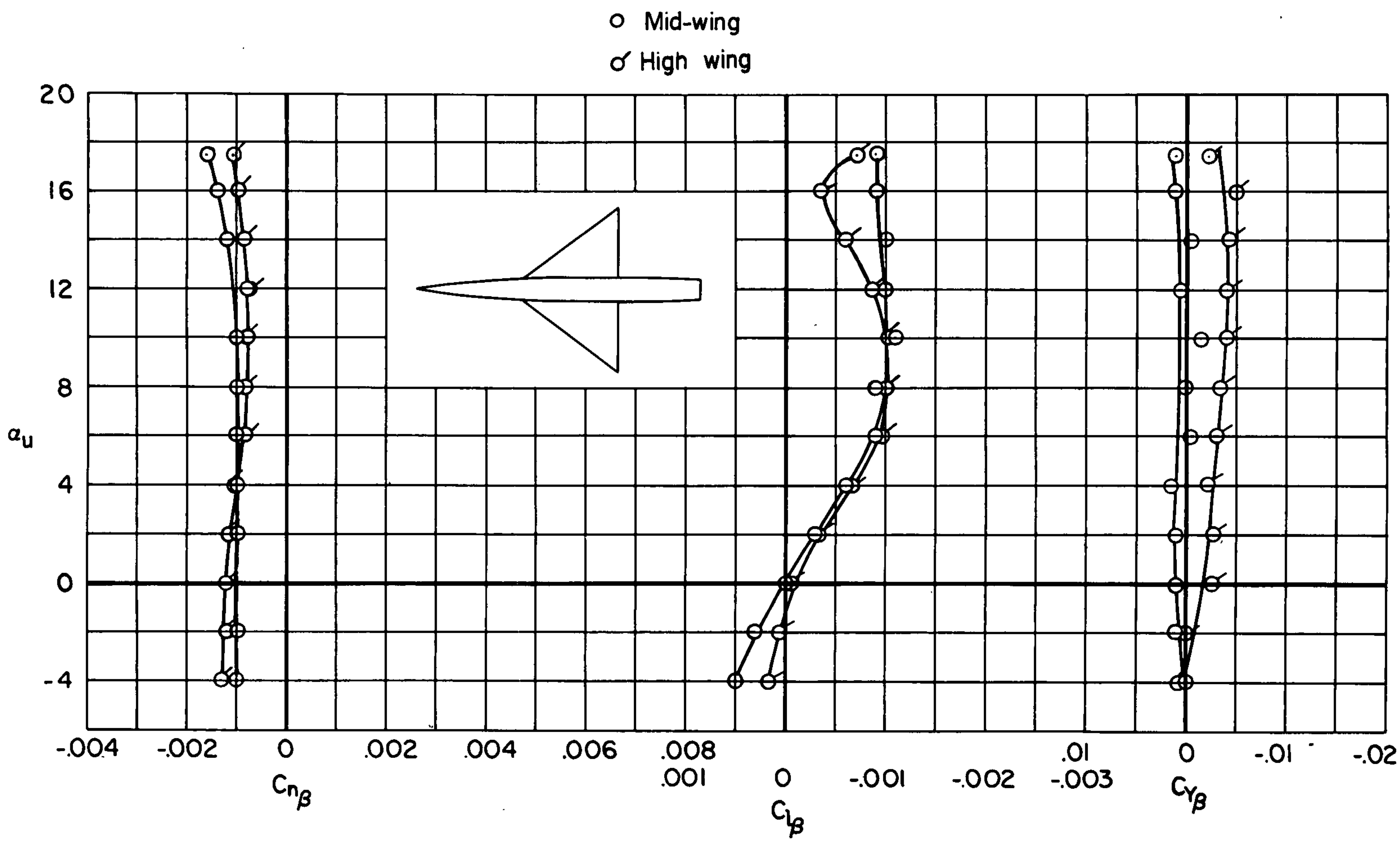
[redacted]



(d) M = 0.95

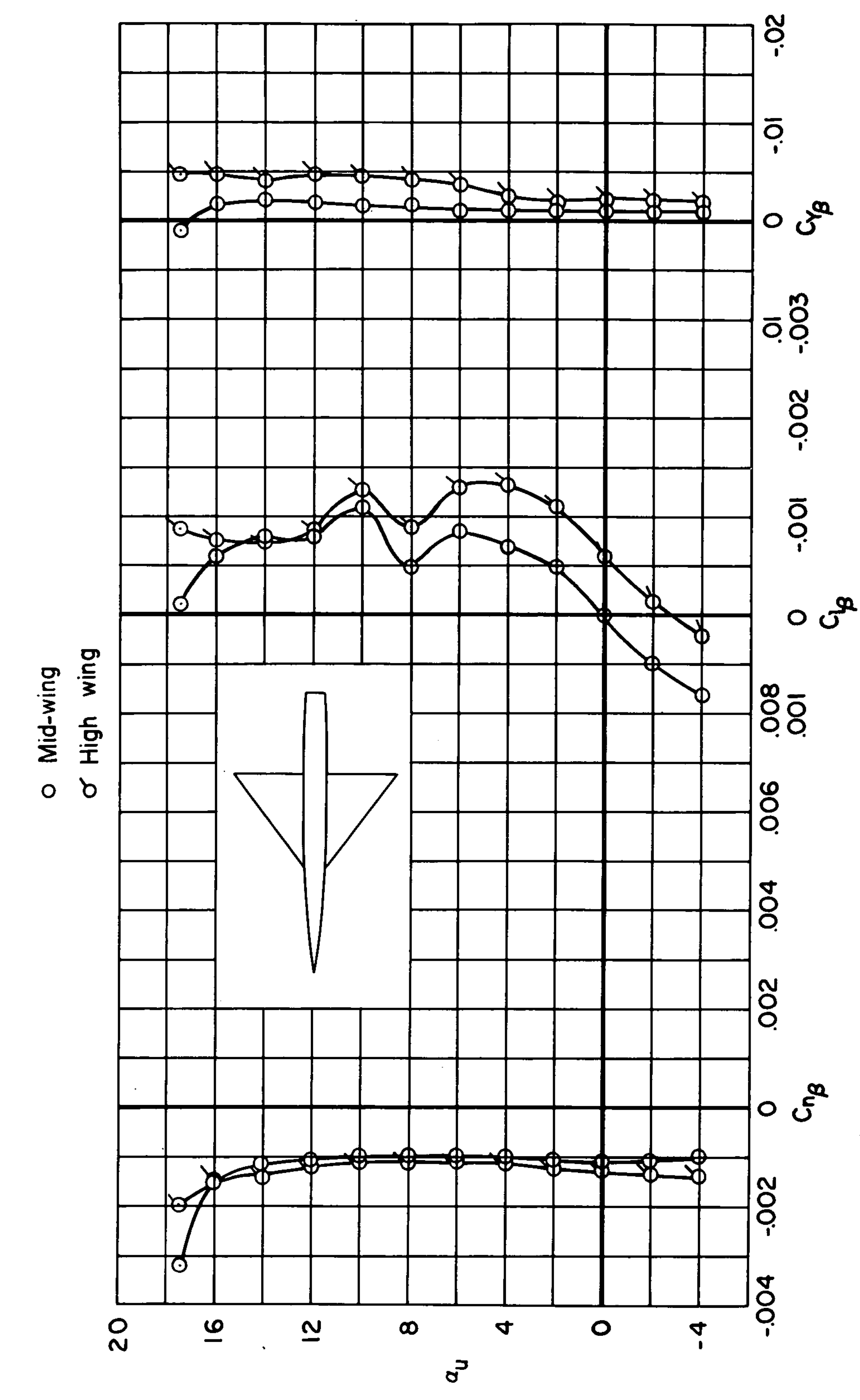
Figure 7.- Concluded.

[redacted]



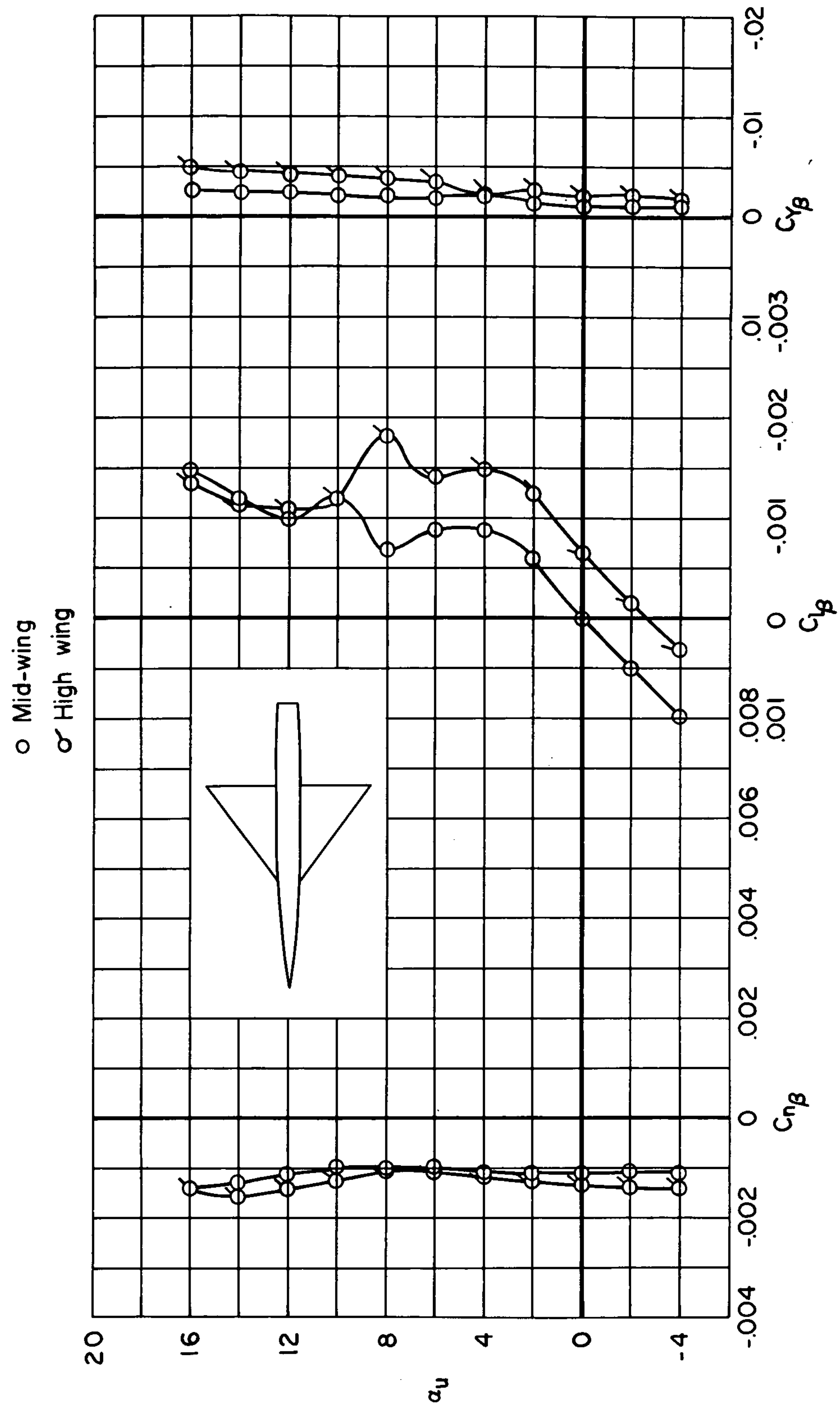
(a) M = 0.25

Figure 8.- Lateral stability characteristics of wing-fuselage combinations; n = 12.0.



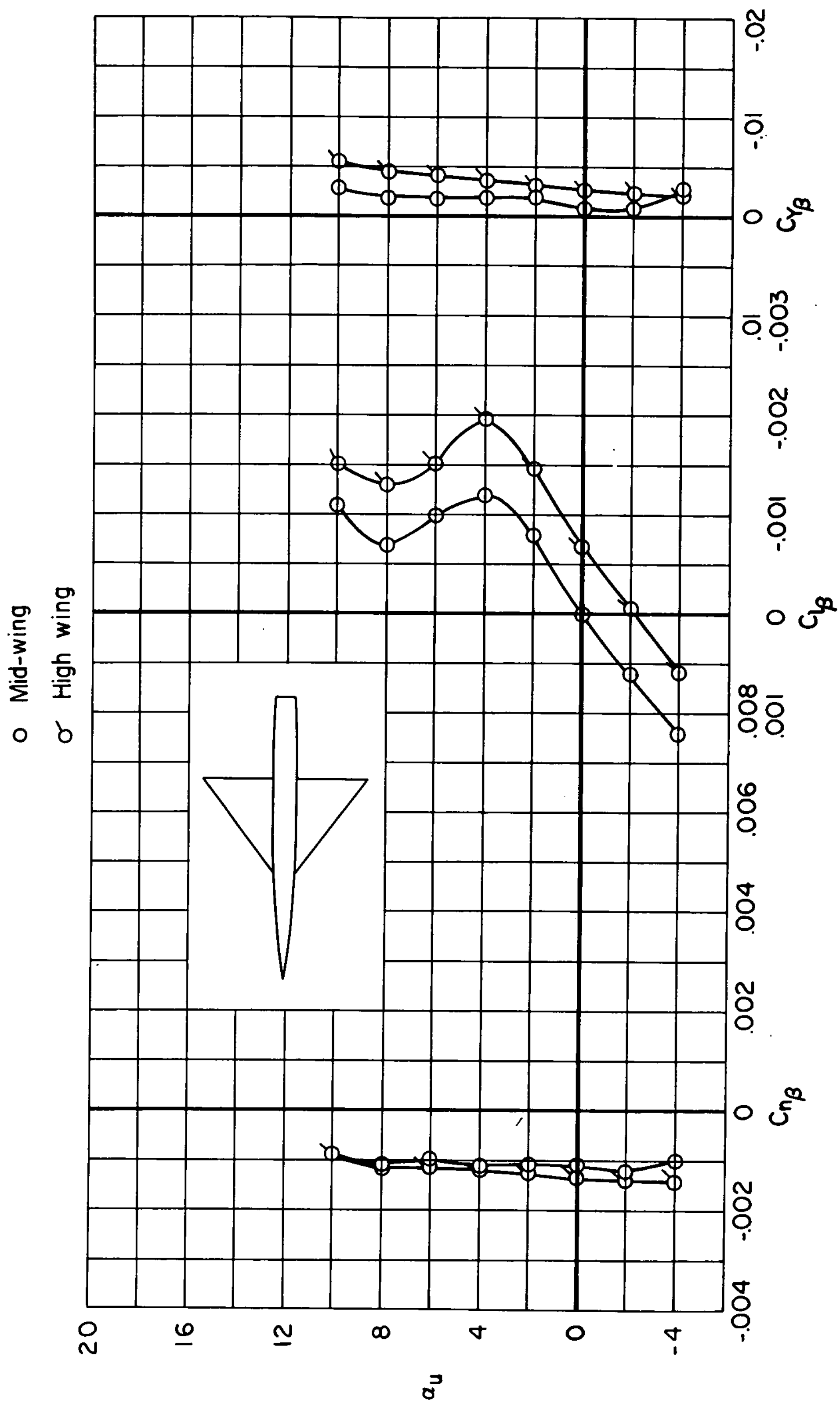
(b) M = 0.80

Figure 8.- Continued.



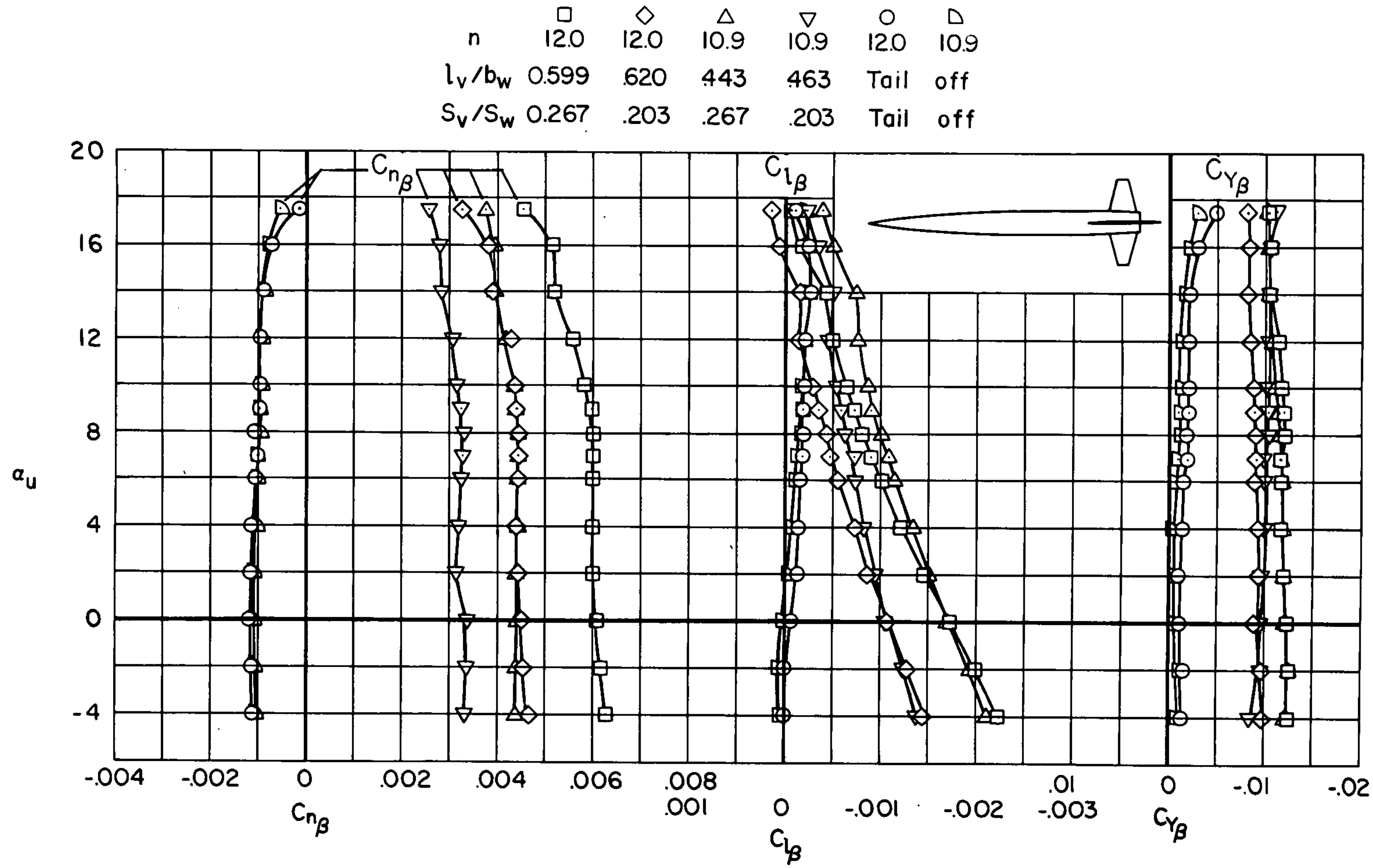
(c) M = 0.90

Figure 8.- Continued.



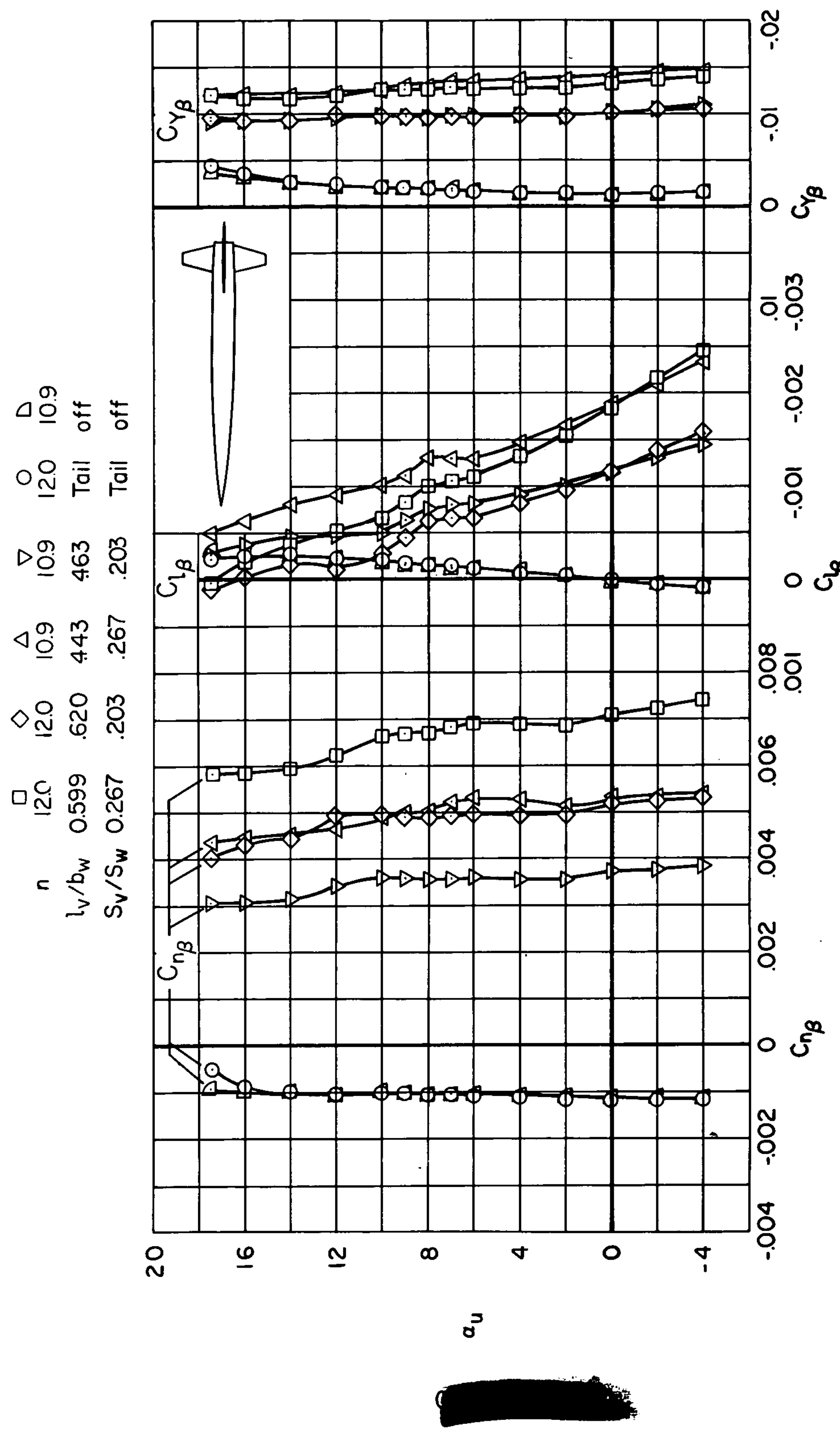
(d) M = 0.95

Figure 8.- Concluded.



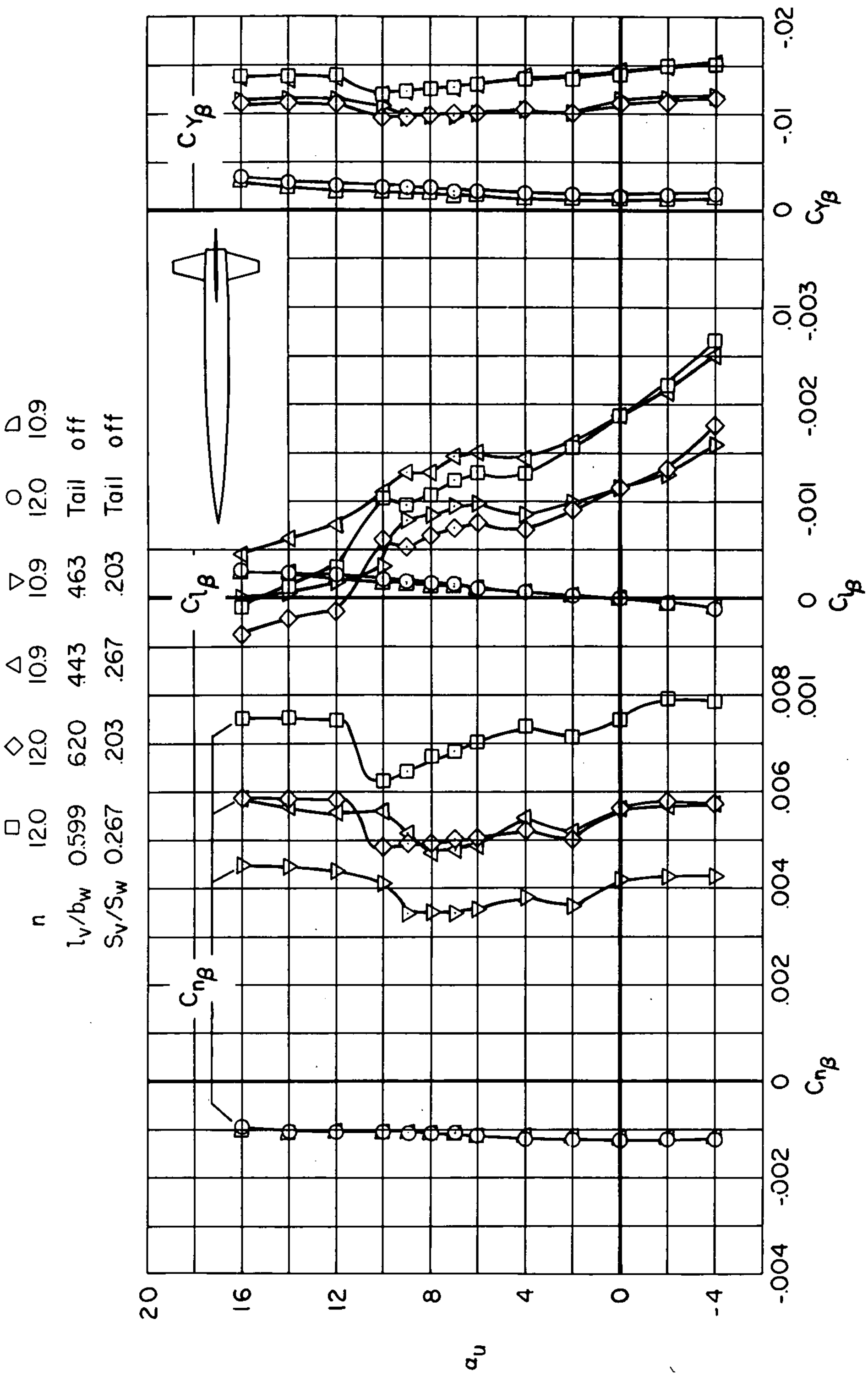
(a) M = 0.25

Figure 9.- The lateral and directional stability characteristics of the fuselage alone and of the fuselage in combination with the vertical and horizontal tails.



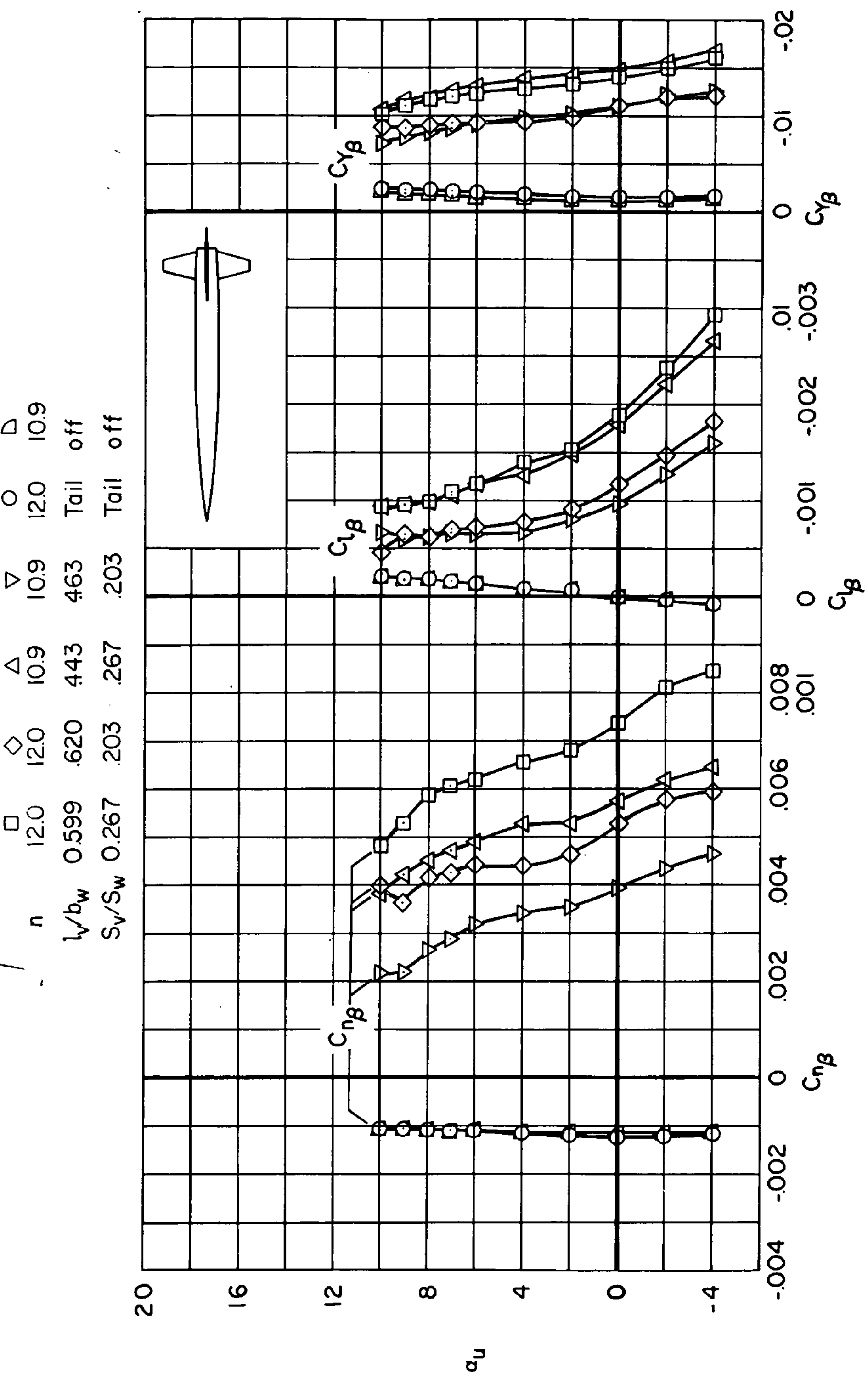
(b) M = 0.80

Figure 9.- Continued.



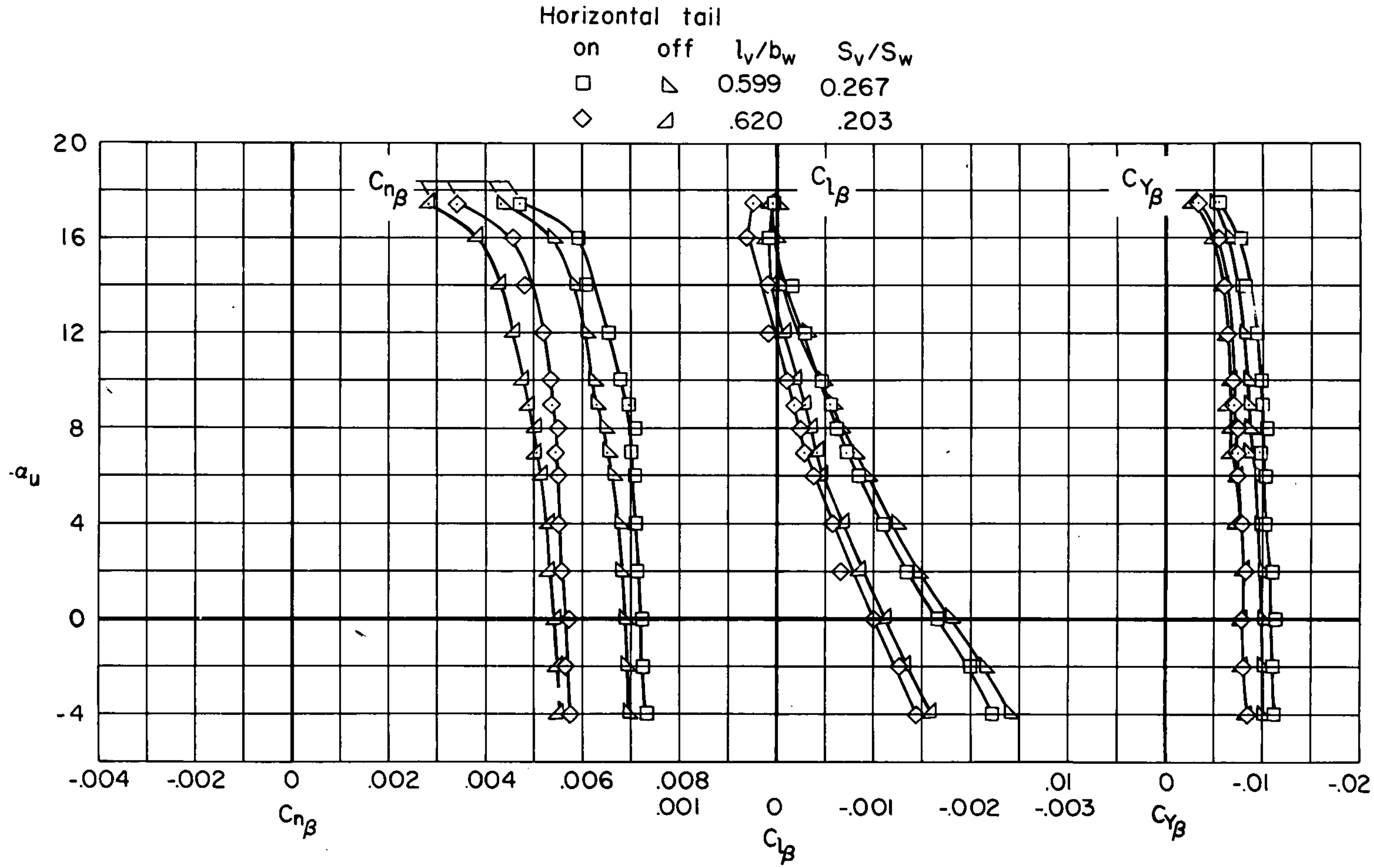
(c) M = 0.90

Figure 9.- Continued.



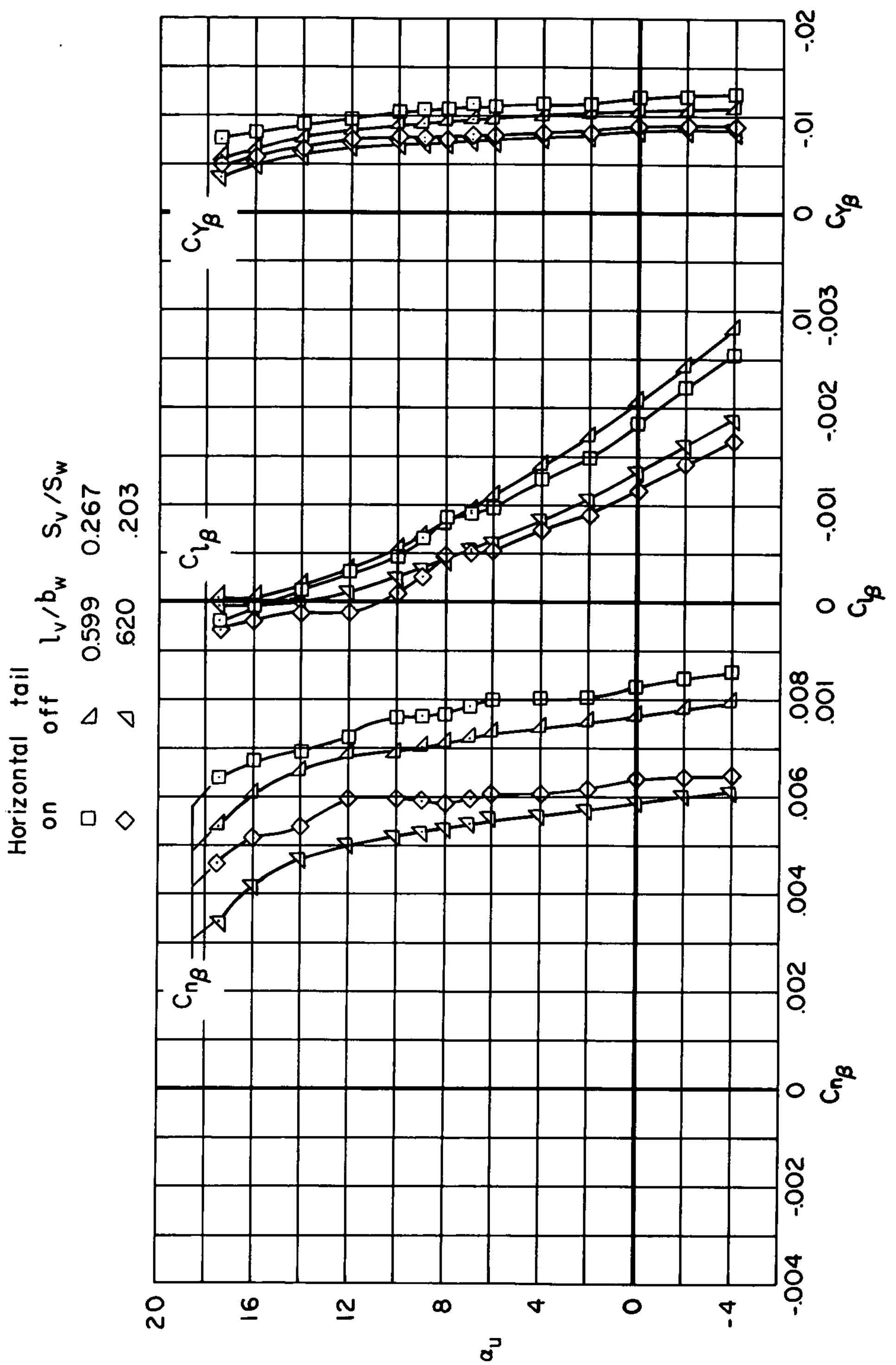
(d) M = 0.95

Figure 9.- Concluded.



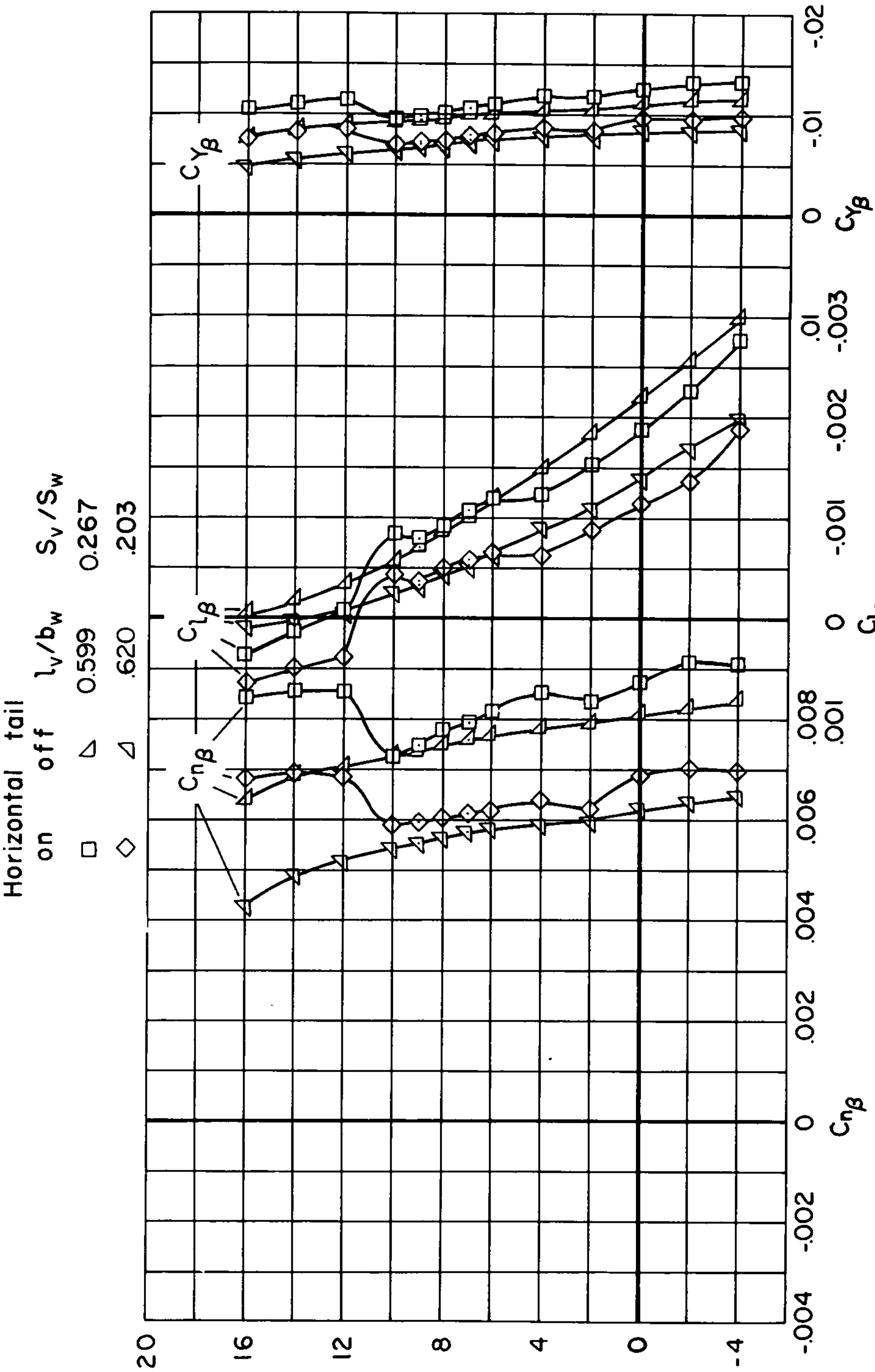
(a) M = 0.25

Figure 10.- The effect of the horizontal tail on the vertical-tail contribution to the lateral and directional stability characteristics of the fuselage-tail combination.



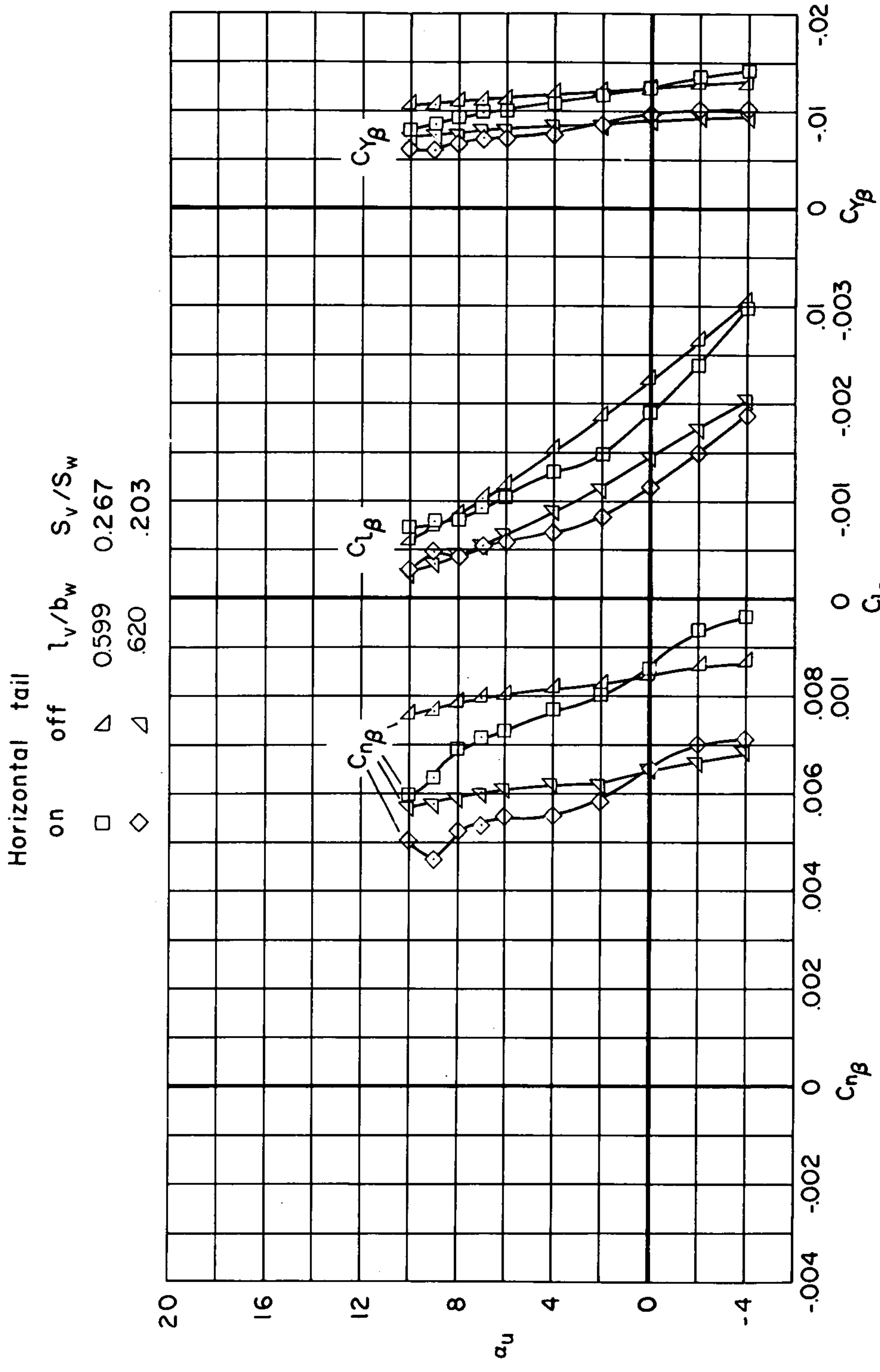
(b) M = 0.80

Figure 10.- Continued.



(c) M = 0.90

Figure 10.- Continued.



(d) M = 0.95

Figure 10.- Concluded.

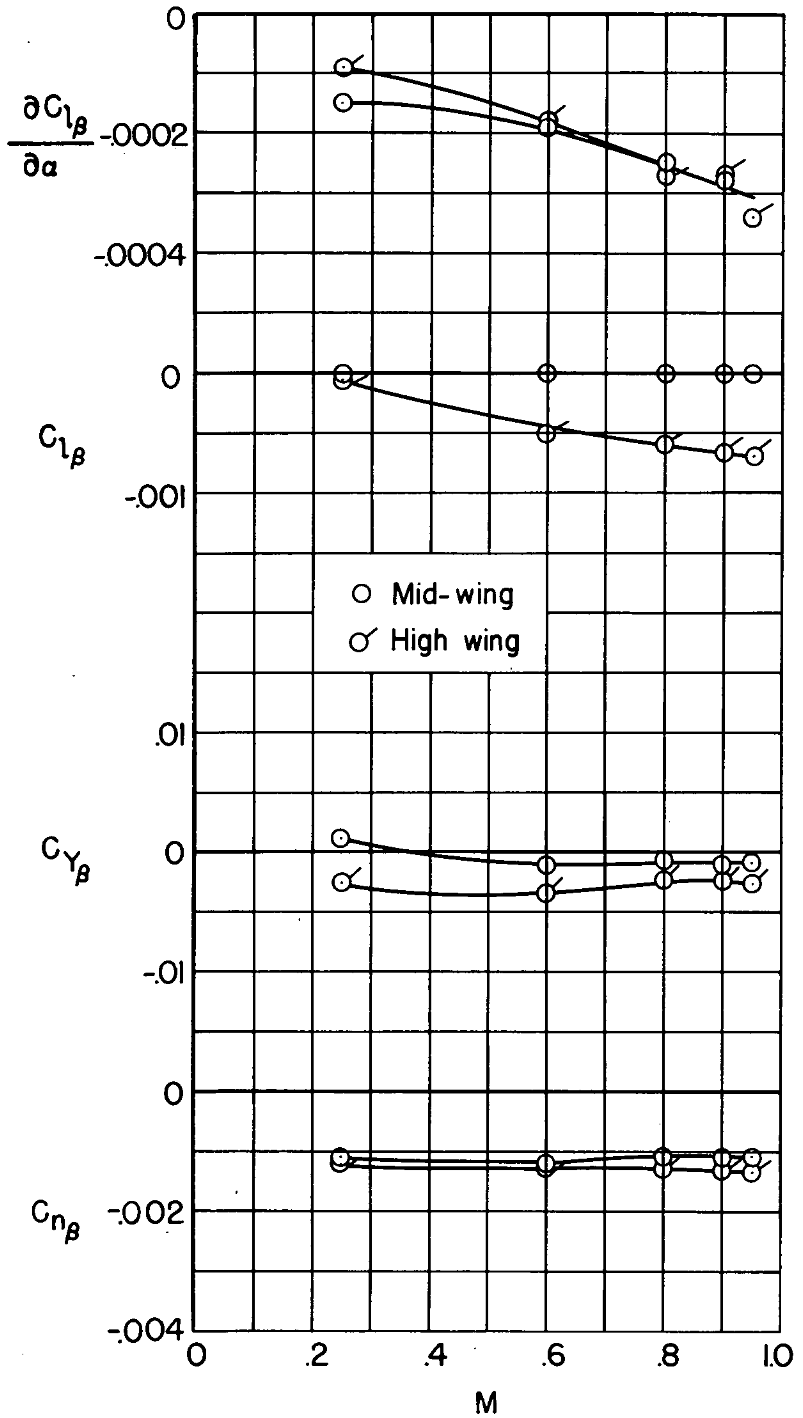


Figure 11.- The effect of Mach number on the lateral and directional stability characteristics of the wing-fuselage combination; $\alpha_u = 0^\circ$, $n = 12.0$.

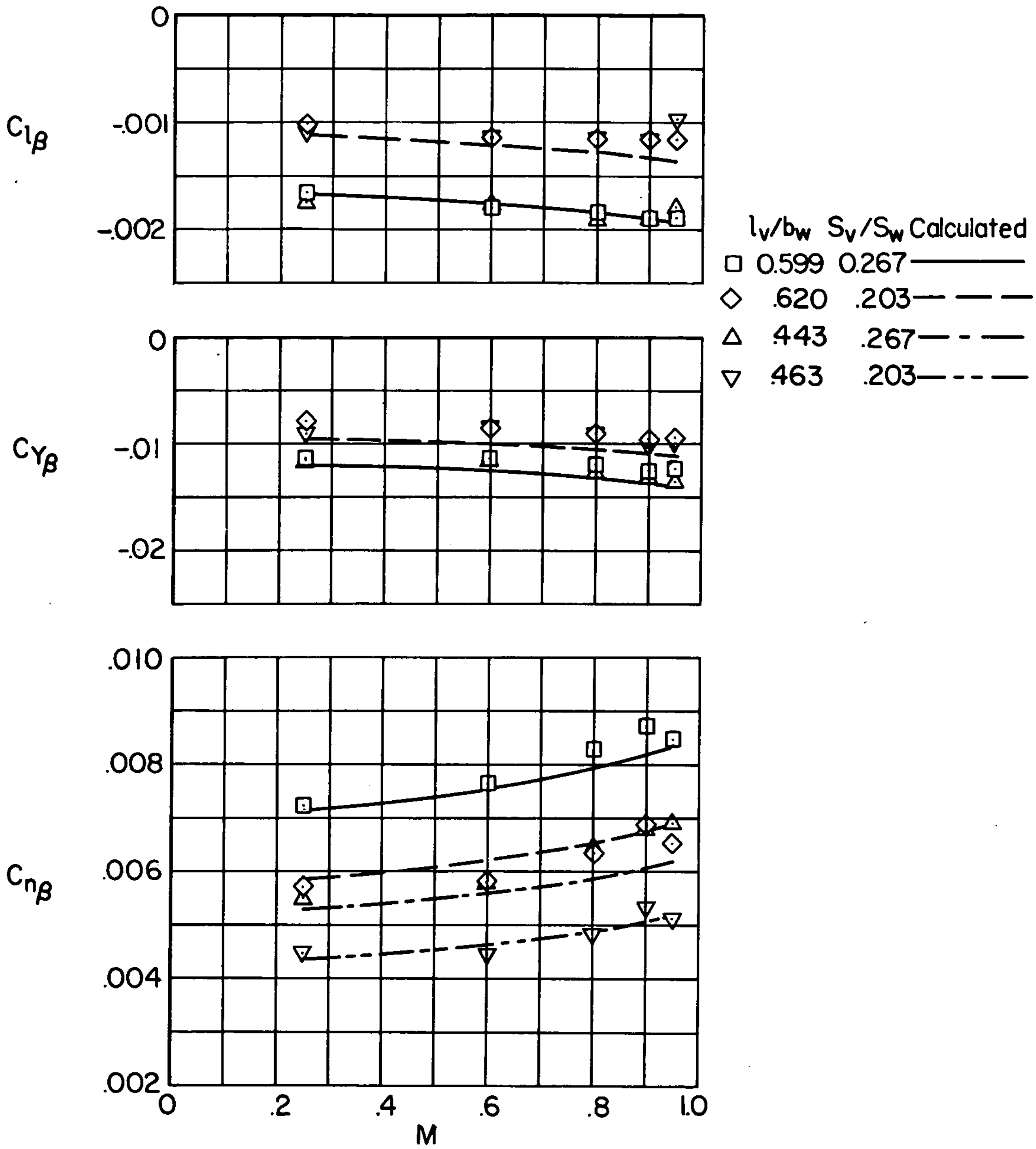


Figure 12.- The effect of Mach number on the tail contribution to the lateral and directional stability characteristics of the fuselage-tail combination; $\alpha_u = 0^\circ$.

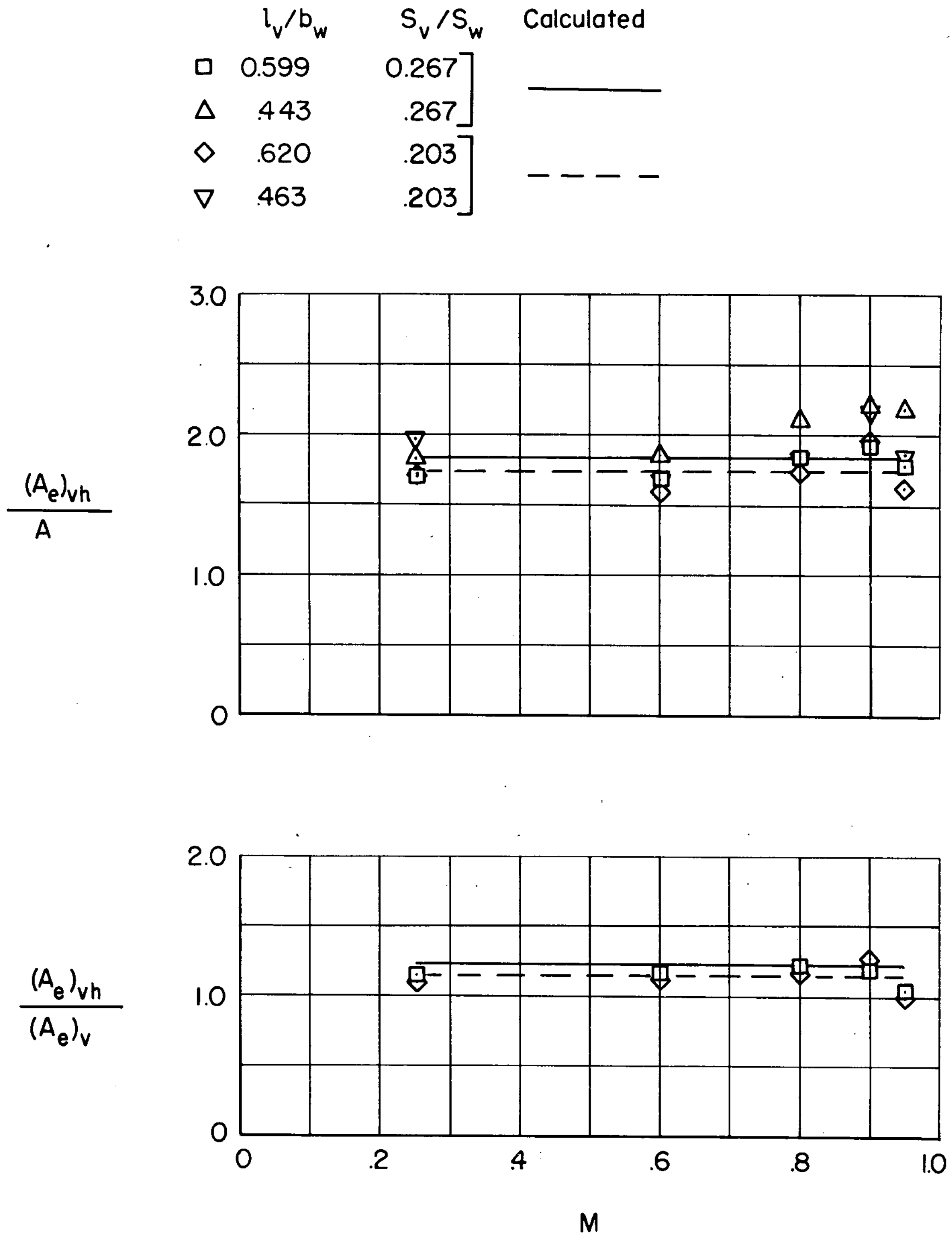
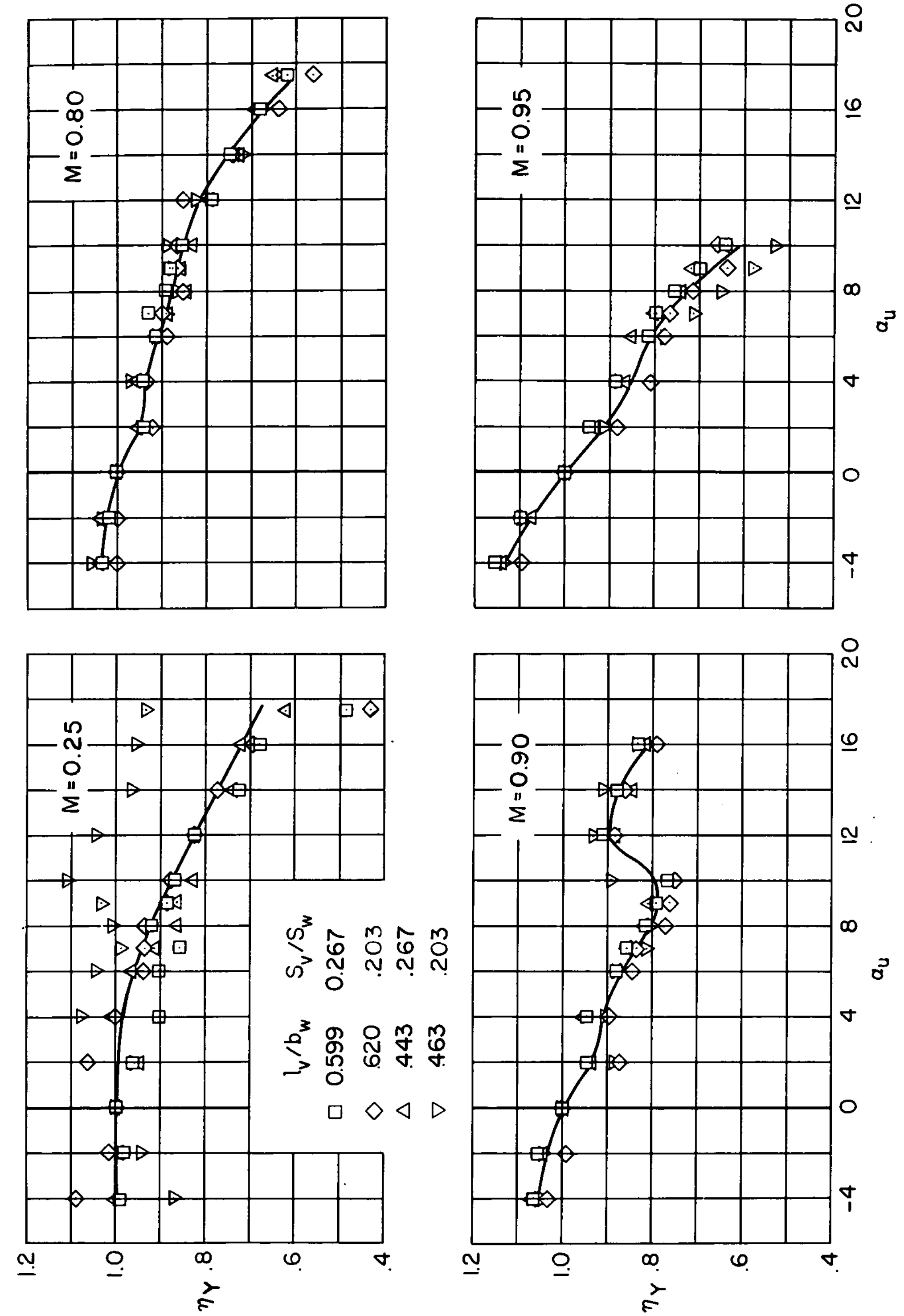
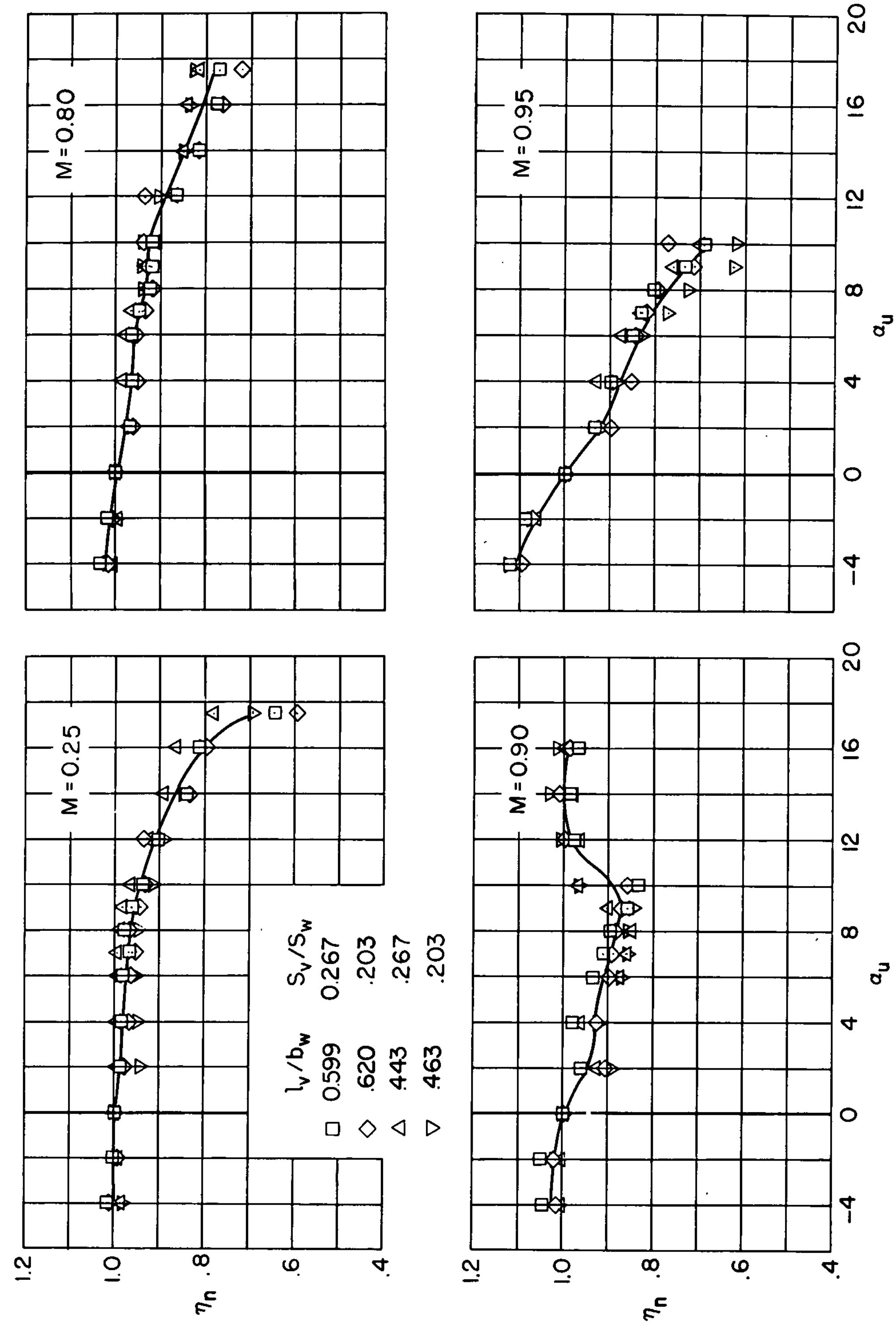


Figure 13.- The effect of the fuselage and horizontal tail on the effective aspect ratio of the vertical tail; $\alpha_u = 0^\circ$.



(a) η_Y

Figure 14.- The variation of the factors η_Y and η_n with angle of attack.



(b) η_n

Figure 14.- Concluded.

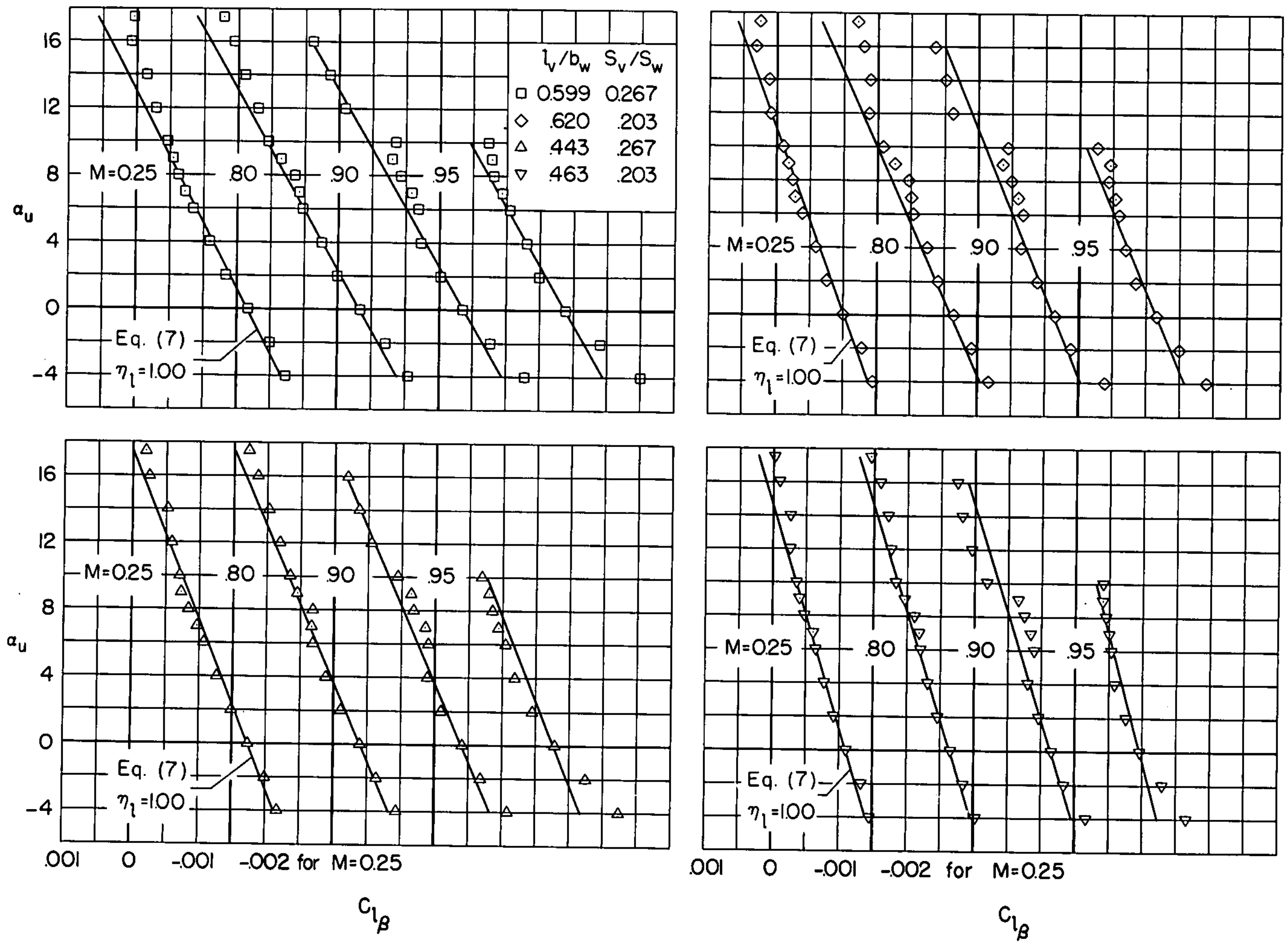
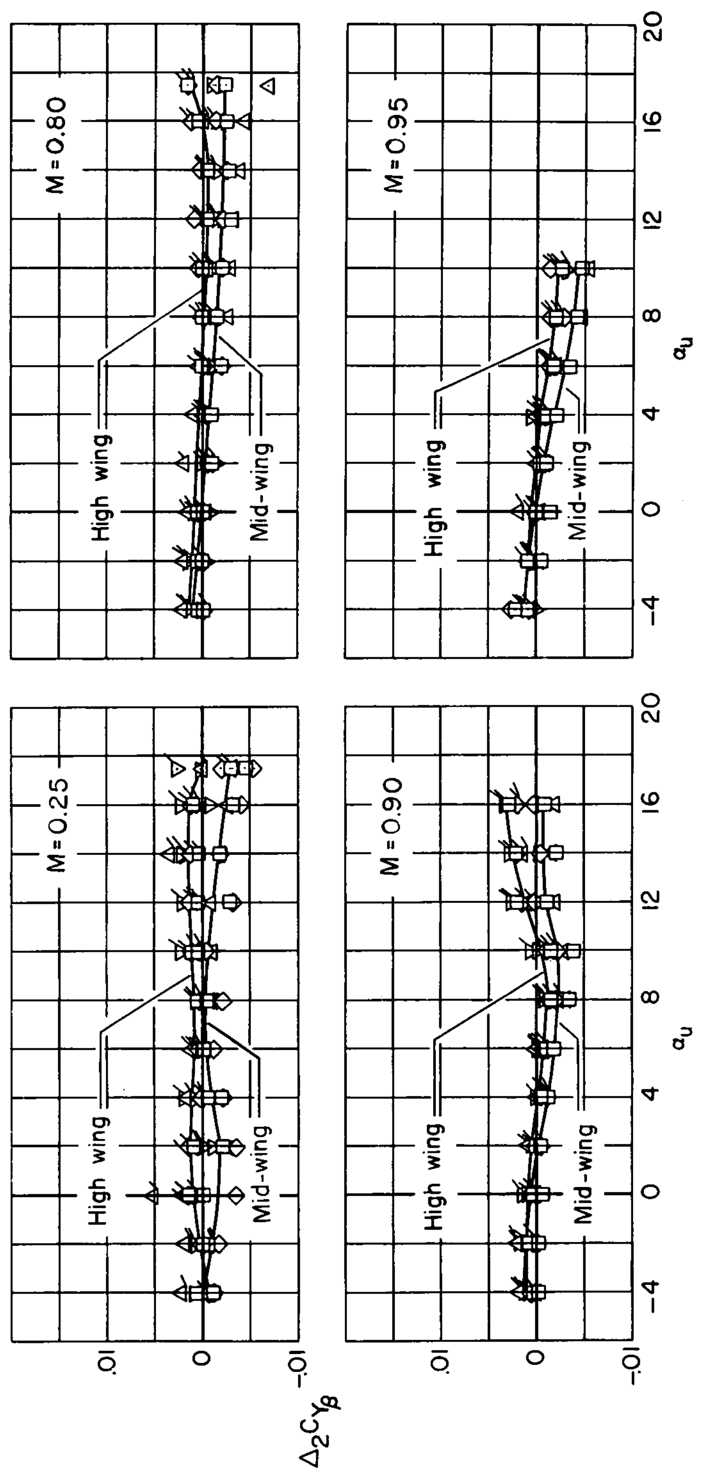


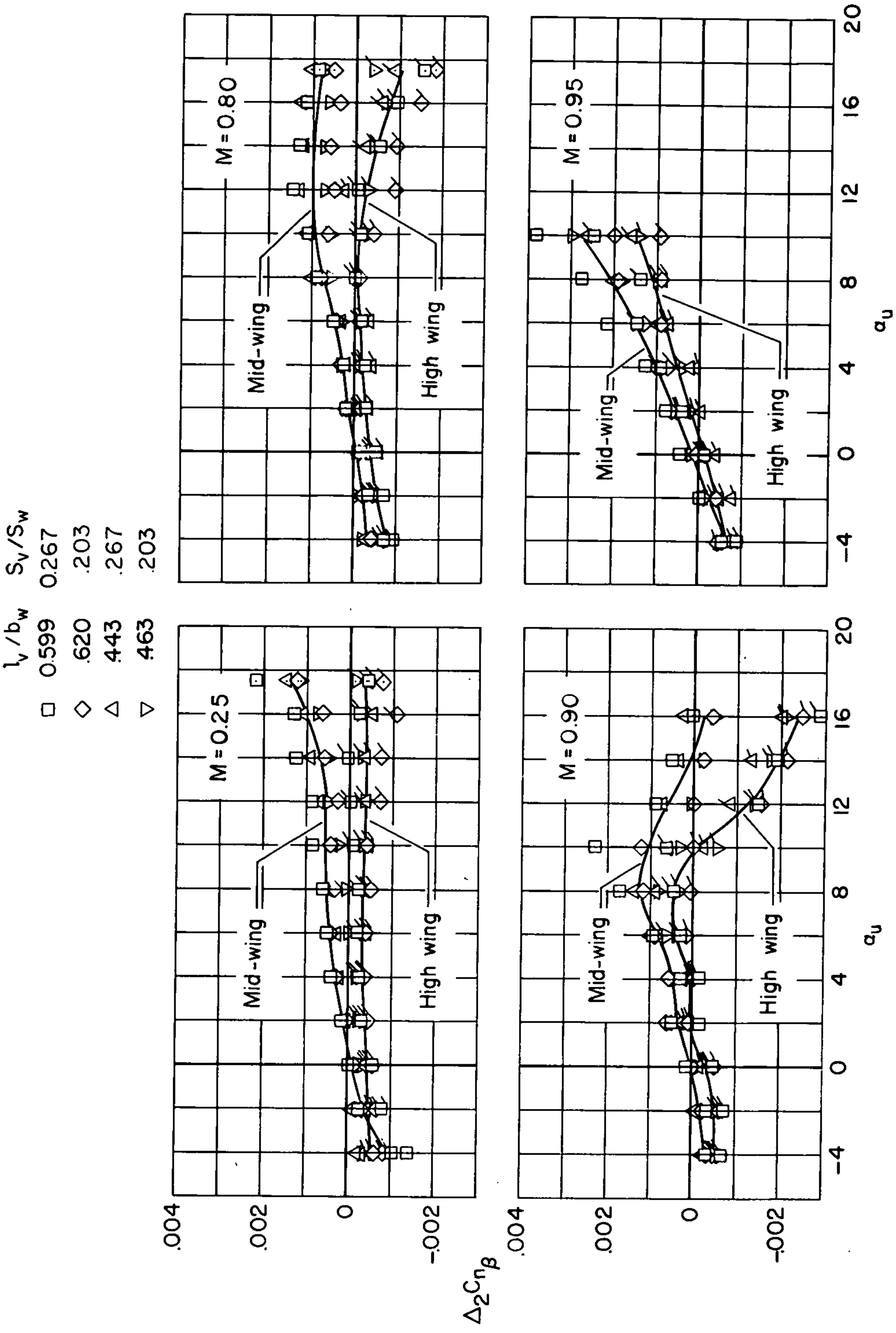
Figure 15.- The experimental variation with angle of attack of the tail contribution to C_{l_β} of the fuselage-tail conbination compared to the variation calculated from equation (7).

[redacted]



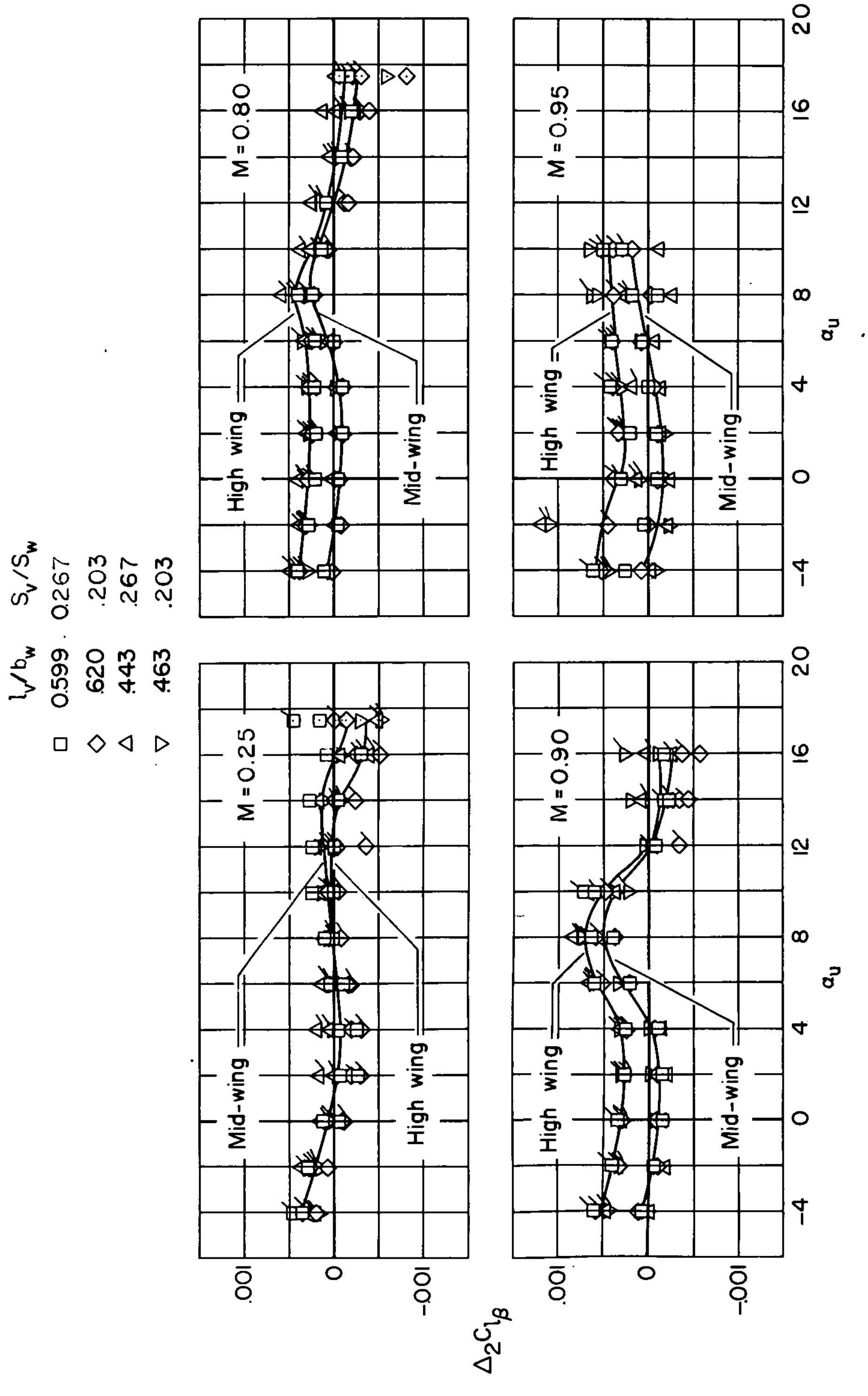
(a) $\Delta_2 C_{Y_\beta}$ vs. α_u

Figure 16.- Increments of C_{Y_β}, C_{n_β}, and C_{l_β} caused by the wing interference on the tail effectiveness.



(b) $\Delta_2 C_{n_\beta}$ vs. α_u

Figure 16.- Continued.



(c) $\Delta_2 C_{l_\beta}$ vs. α_u

Figure 16.- Concluded.

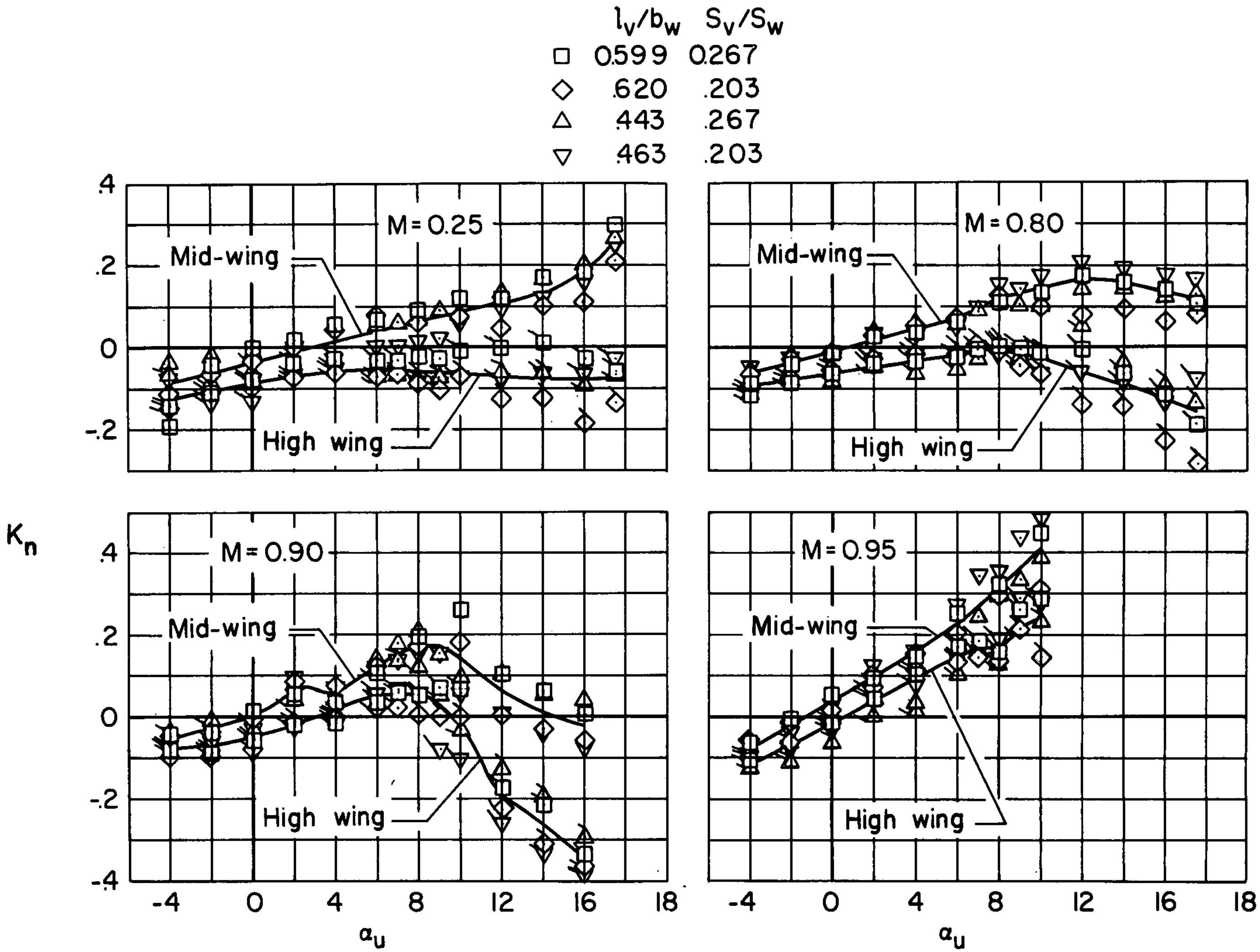
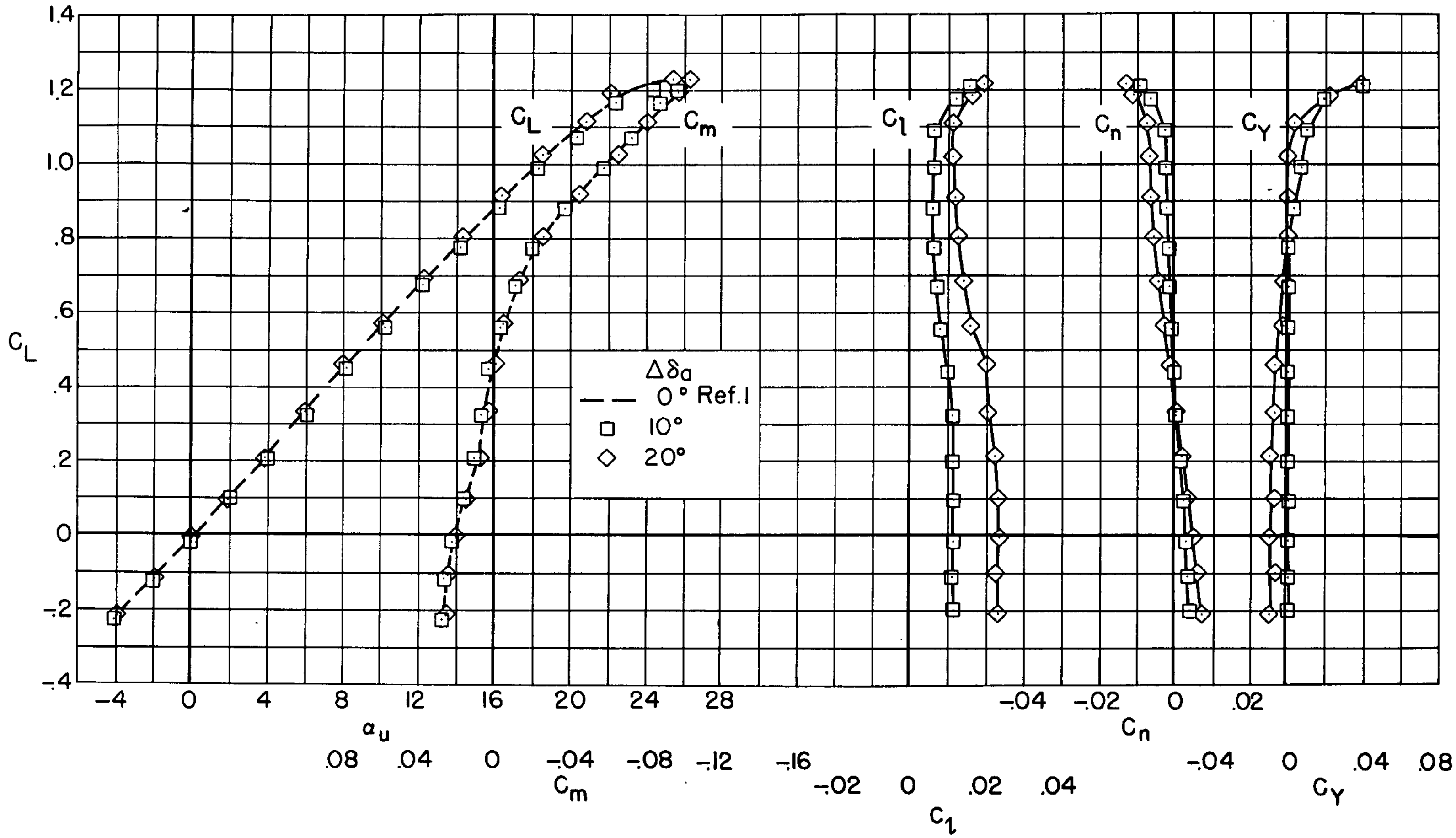
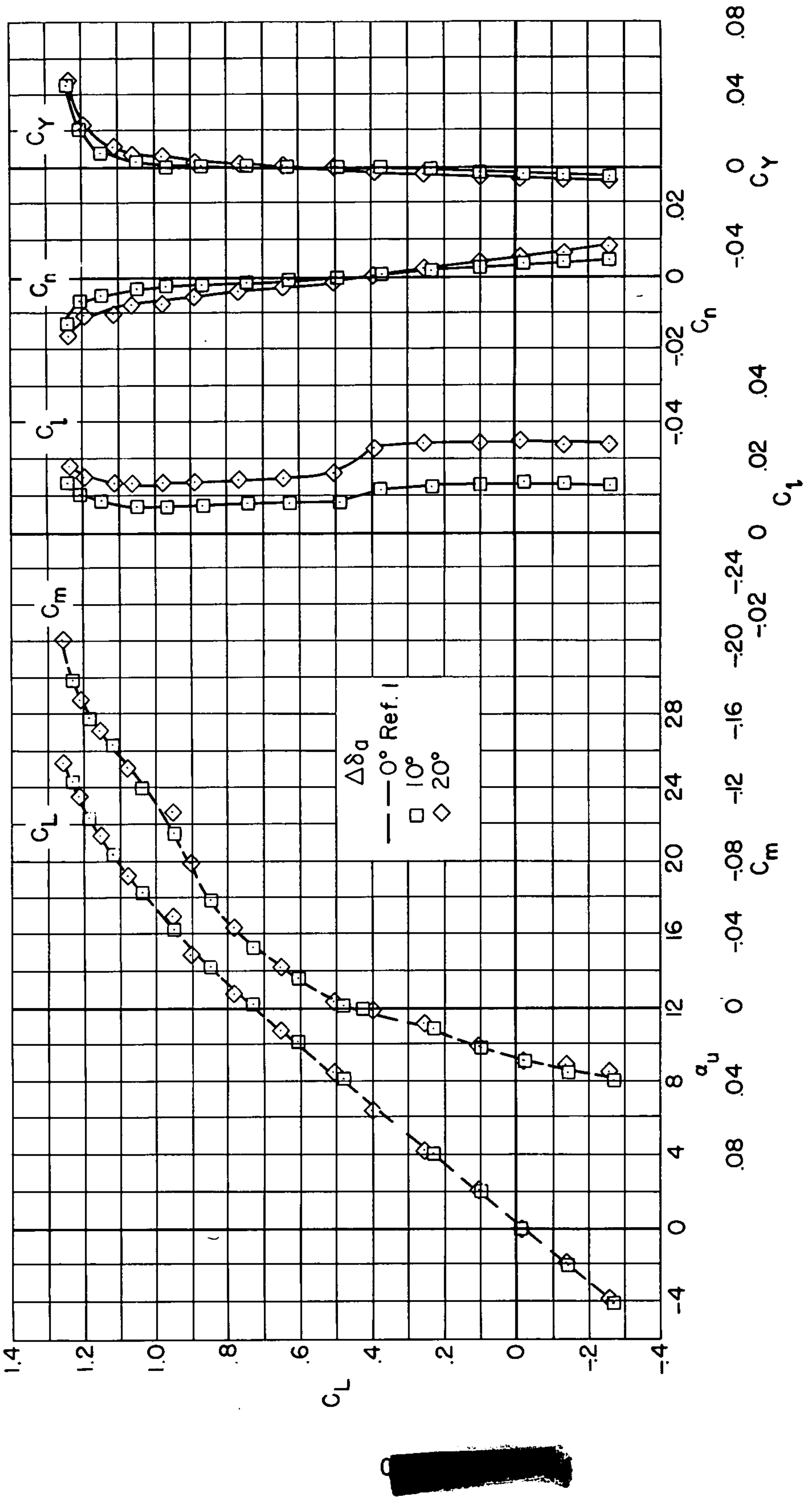


Figure 17.- The variation with angle of attack of the wing-tail interference factor K_n.



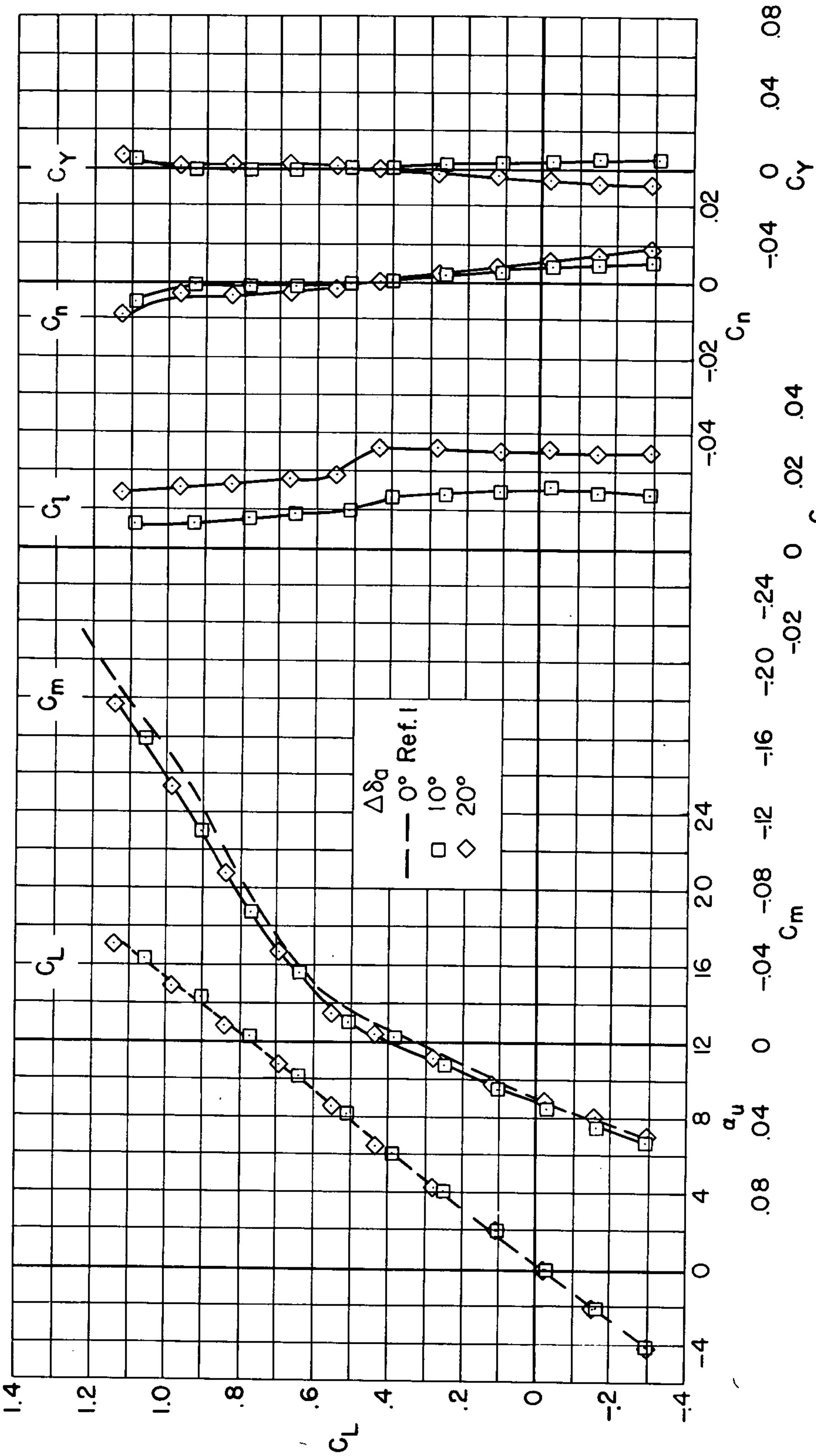
(a) M = 0.25

Figure 18.- The effects of aileron deflection on the aerodynamic characteristics of the high-wing model; $l_V/b_W = 0.599$, $S_V/S_W = 0.267$, $\beta = 0^\circ$.



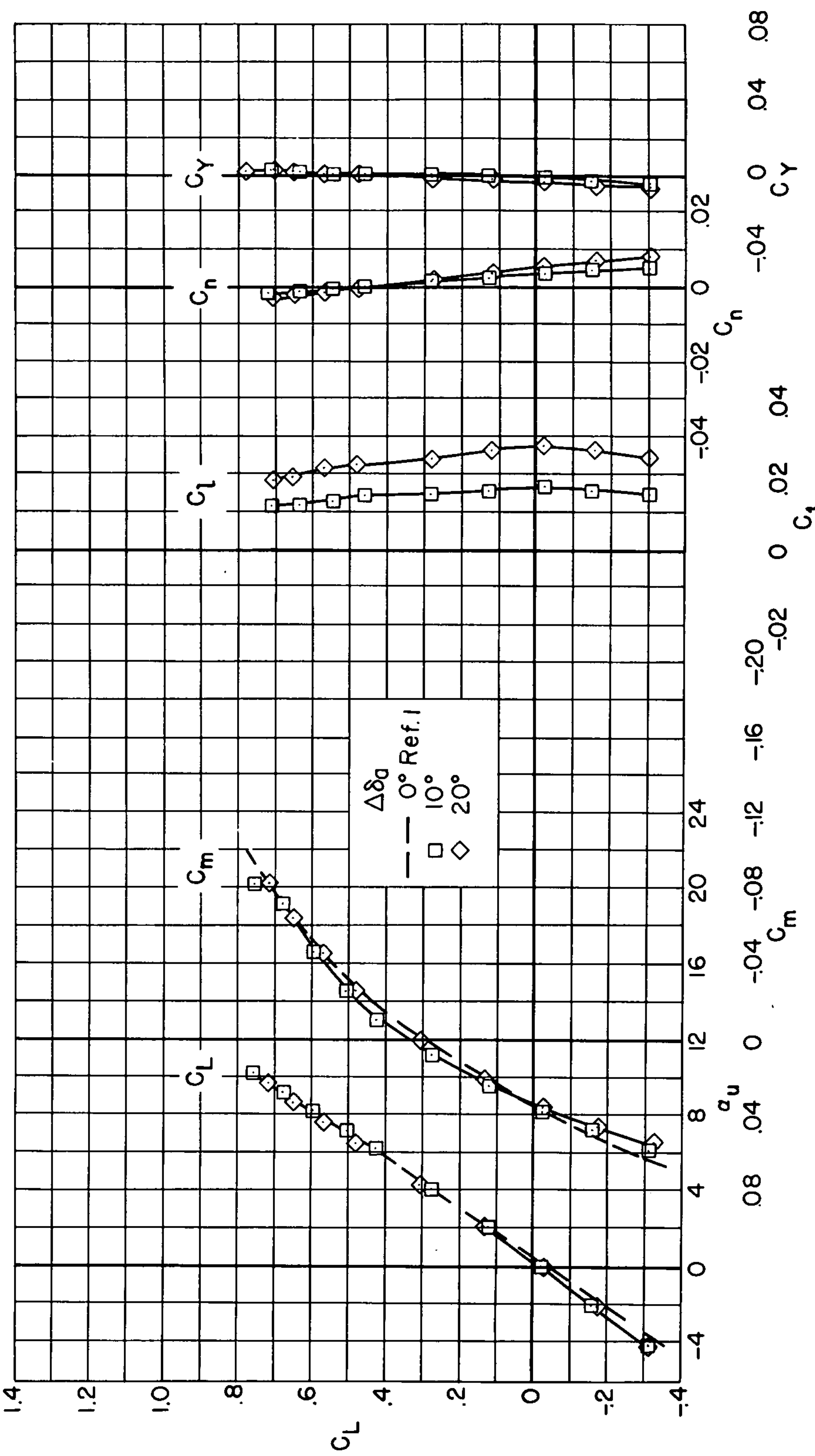
(b) M = 0.80

Figure 18.- Continued.



(c) M = 0.90

Figure 18.- Continued.



(d) M = 0.95

Figure 18.- Concluded.

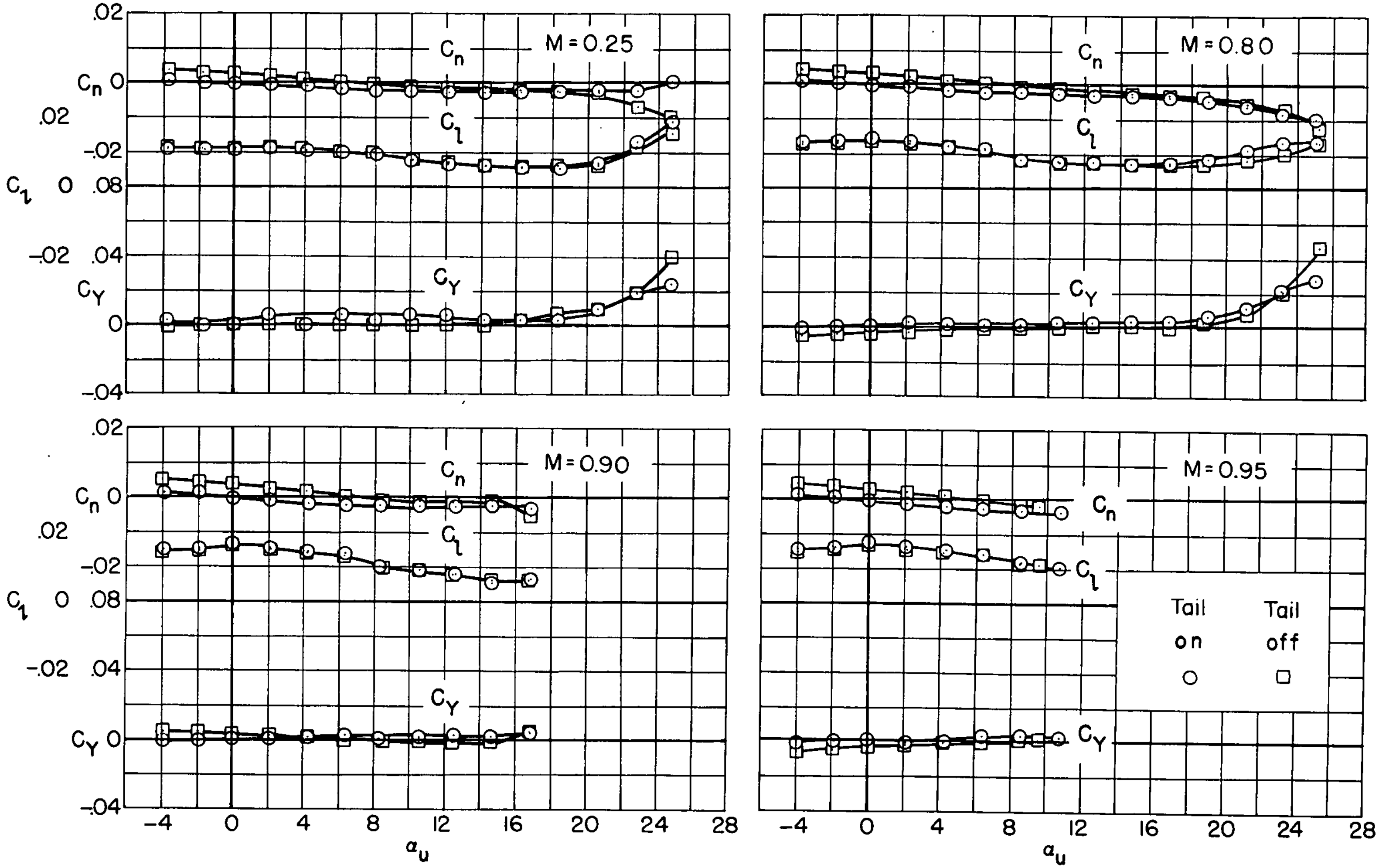
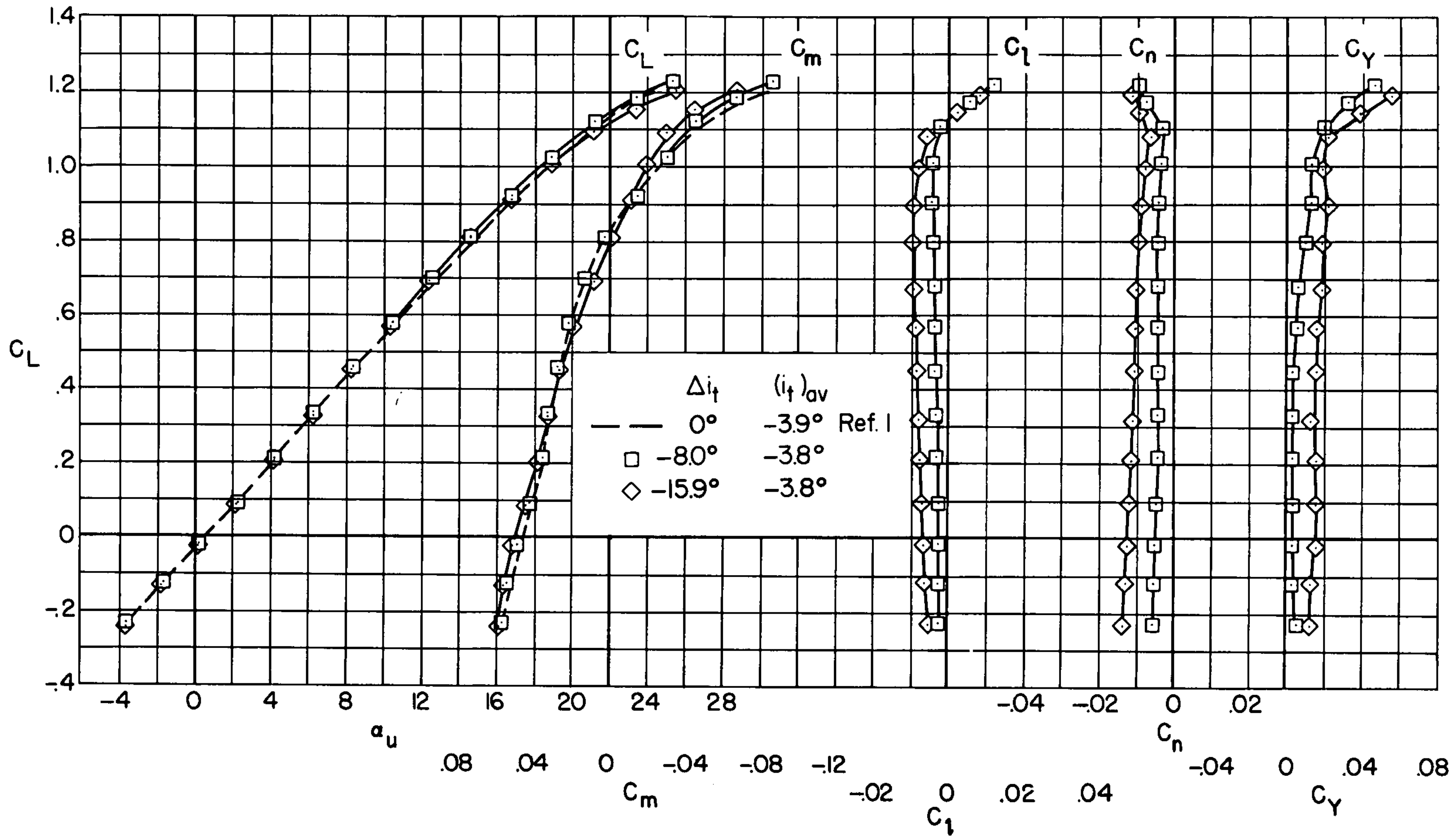
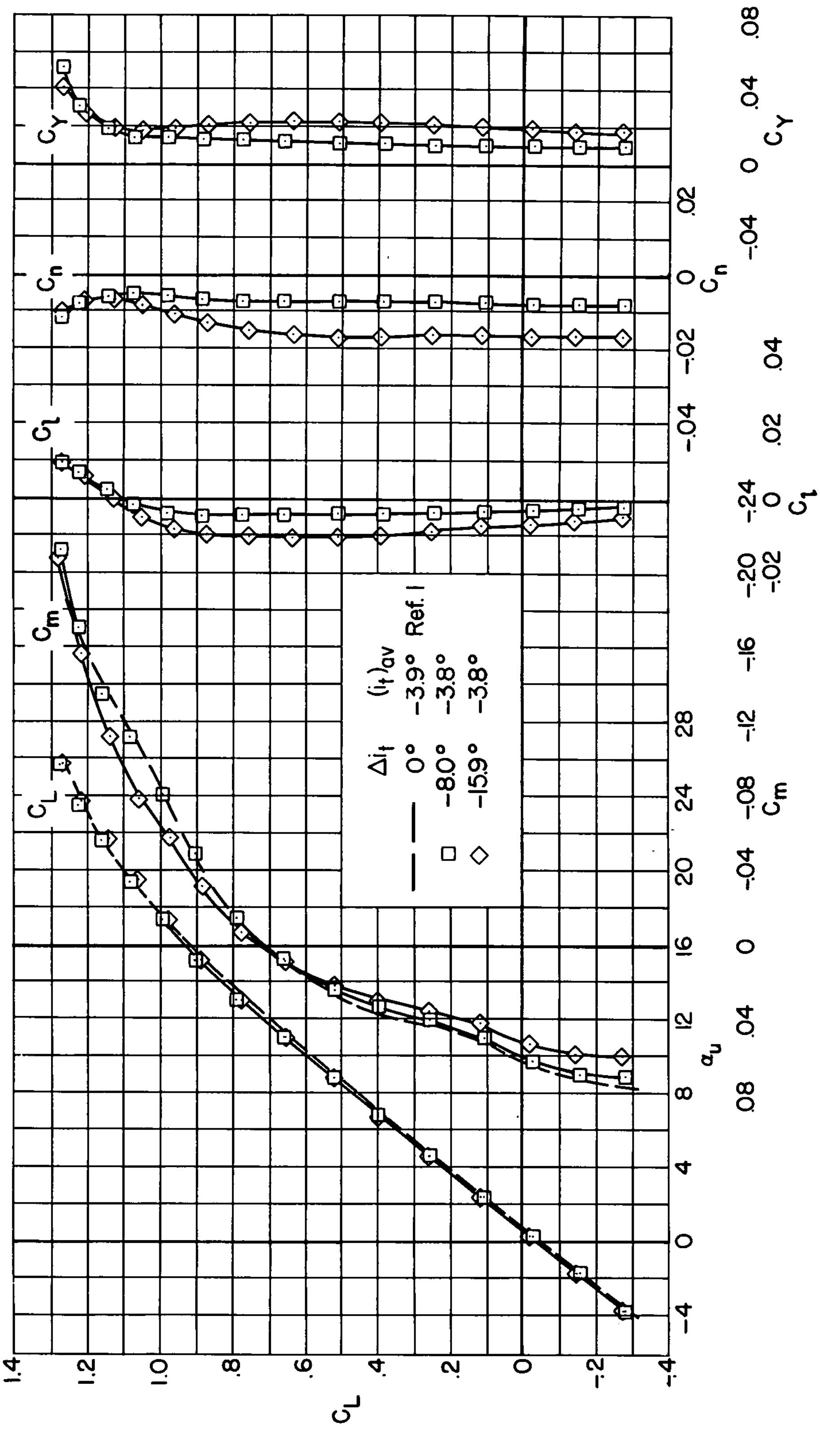


Figure 19.- The effect of the tail assembly on the aileron-control characteristics of the high-wing model; $\Delta\delta_a = 10^\circ$, $l_V/b_W = 0.599$, $S_V/S_W = 0.267$, $\beta = 0^\circ$.



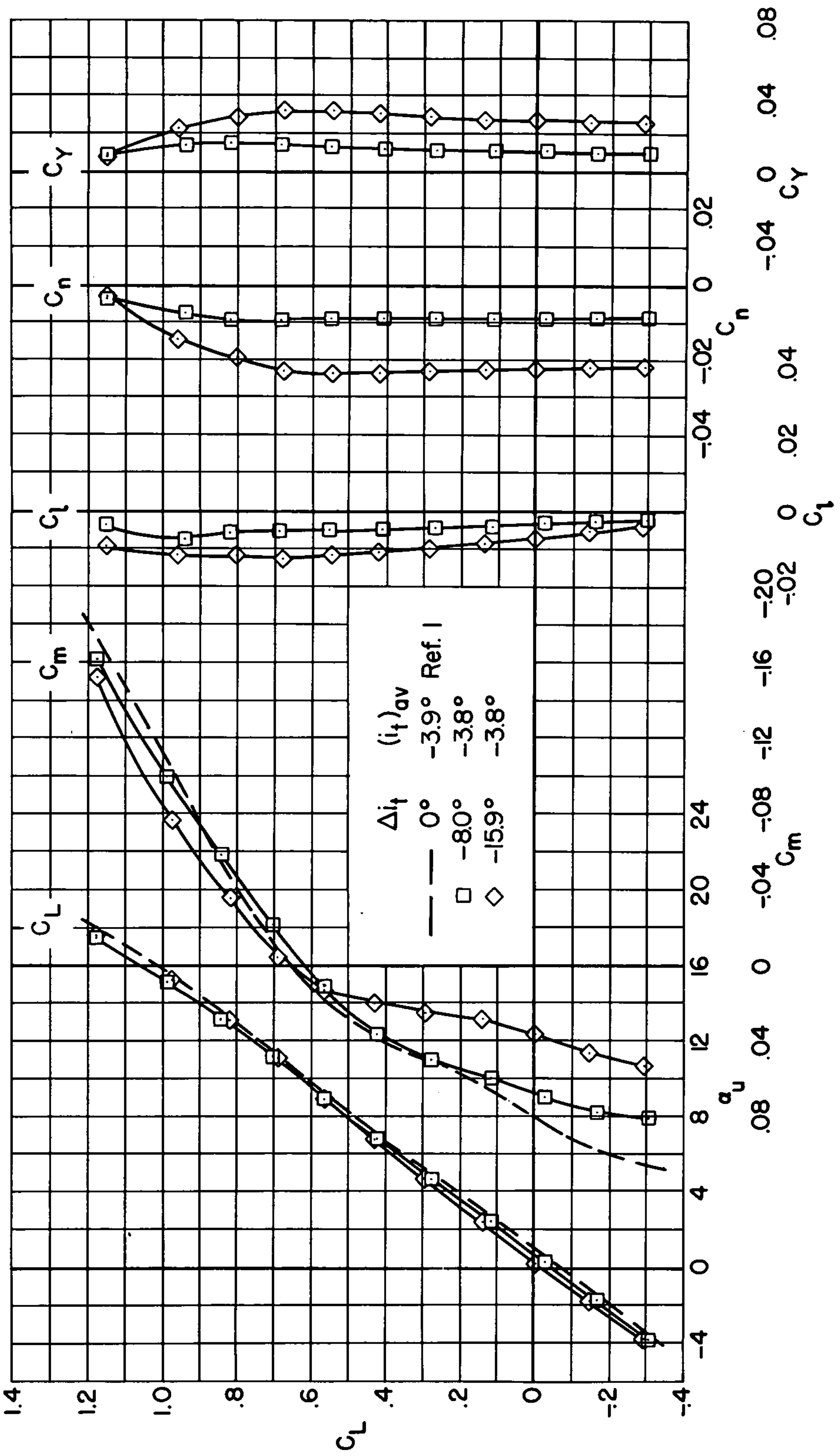
(a) M = 0.25

Figure 20.- The effects of deflection of the horizontal tail surface to provide lateral control on the aerodynamic characteristics of the high-wing model; $l_V/b_W = 0.599$, $S_V/S_W = 0.267$, $\beta = 0^\circ$.



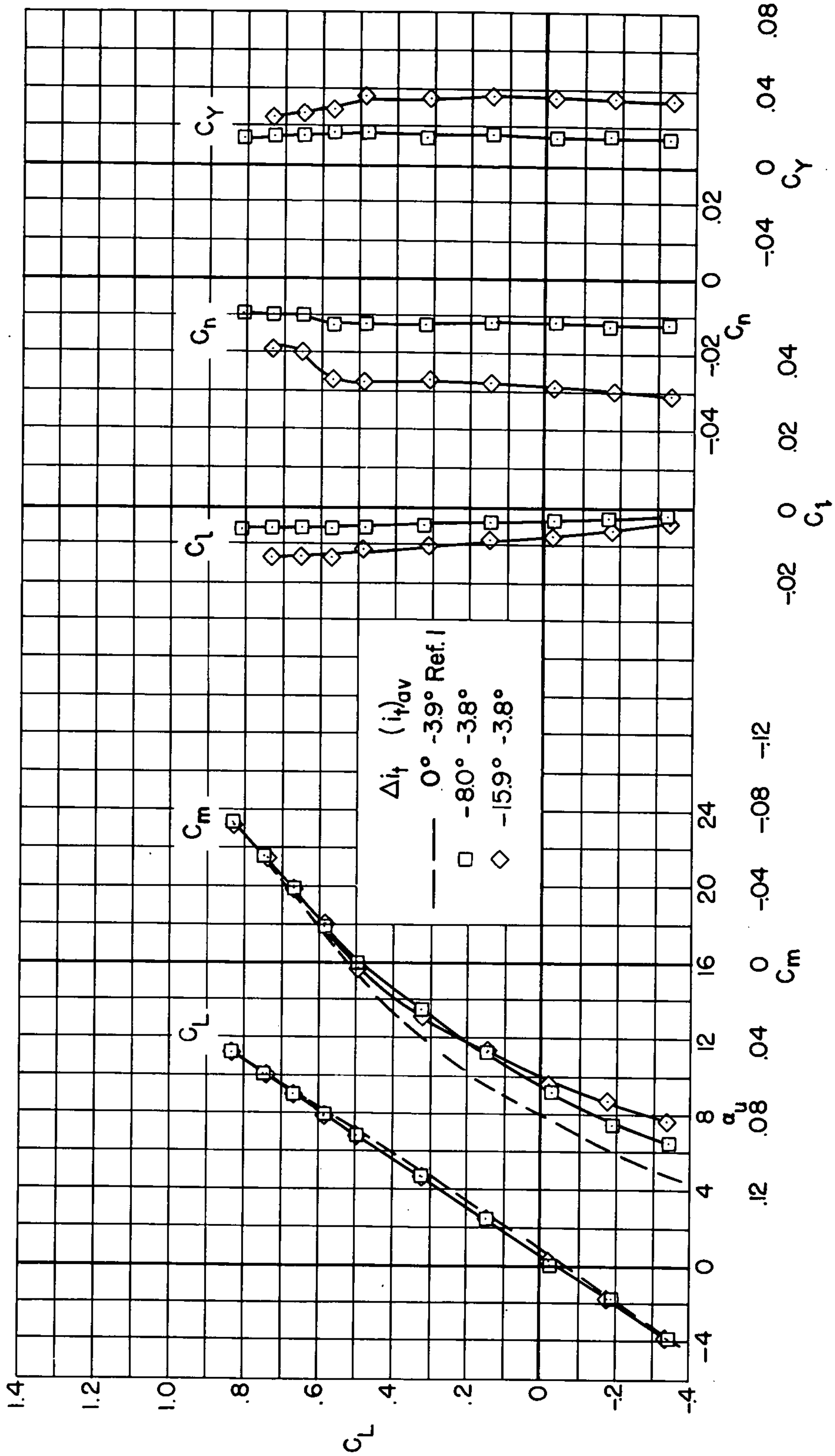
(b) M = 0.80

Figure 20. - Continued.



(c) M = 0.90

Figure 20.- Continued.



(d) M = 0.95

Figure 20.- Concluded.

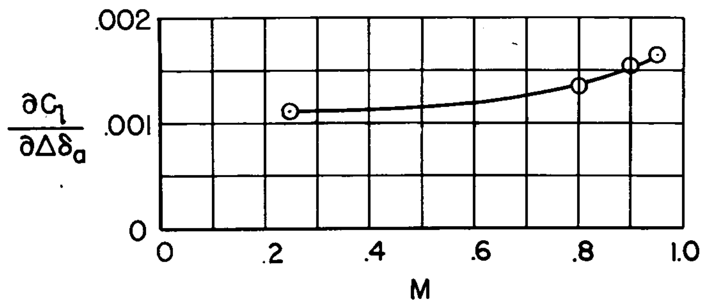


Figure 21.- The effect of Mach number on the aileron effectiveness; $l_V/b_W = 0.599$, $S_V/S_W = 0.267$, $\alpha_u = 0^\circ$, $\beta = 0^\circ$.

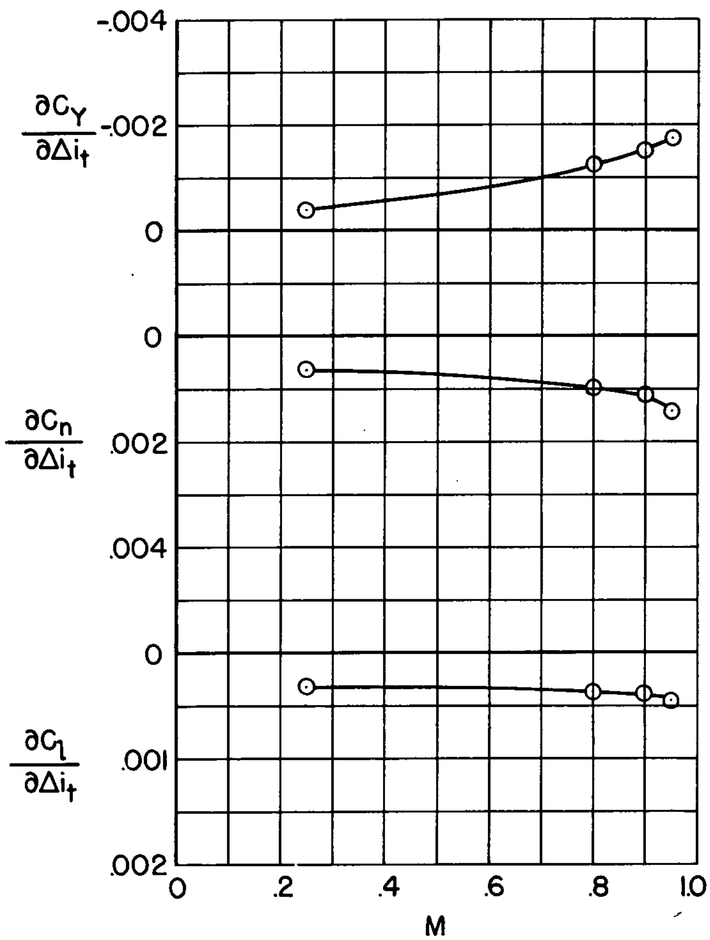
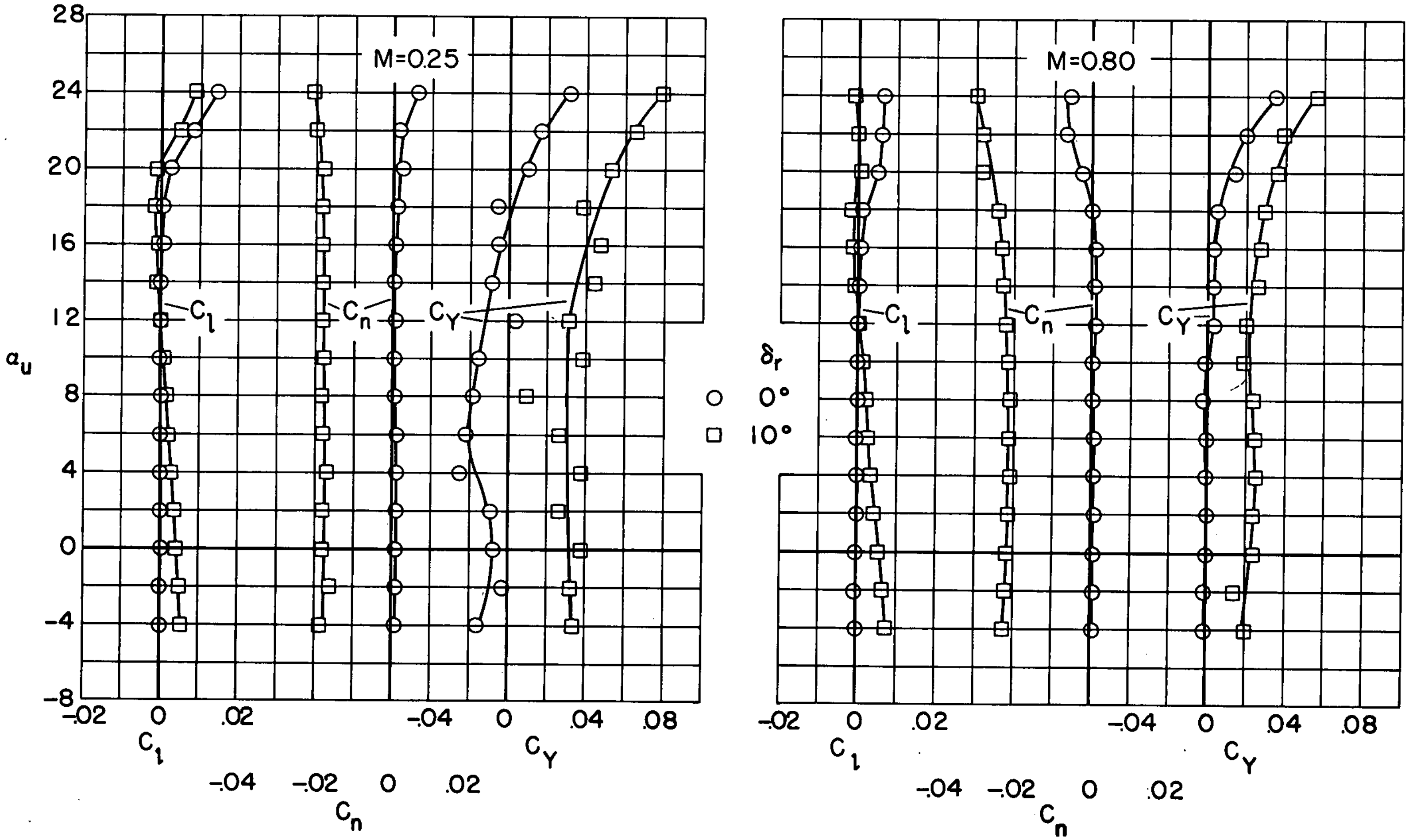
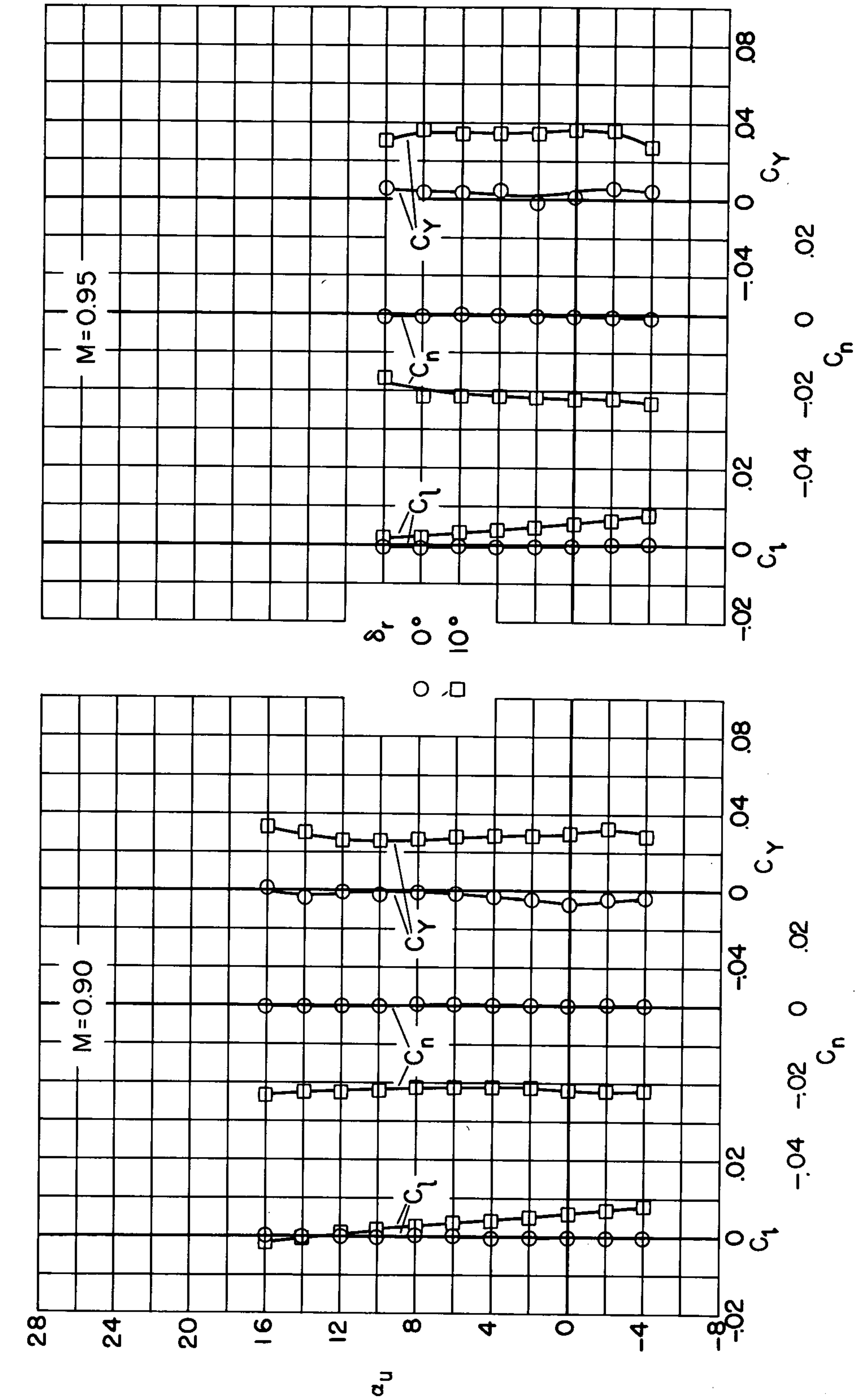


Figure 22.- The variation with Mach number of the rolling moment, side force, and yawing moment per degree of differential deflection of the horizontal tail; $l_V/b_W = 0.599$, $S_V/S_W = 0.267$, $\alpha_u = 0^\circ$, $\beta = 0^\circ$.



(a) M = 0.25 and 0.80

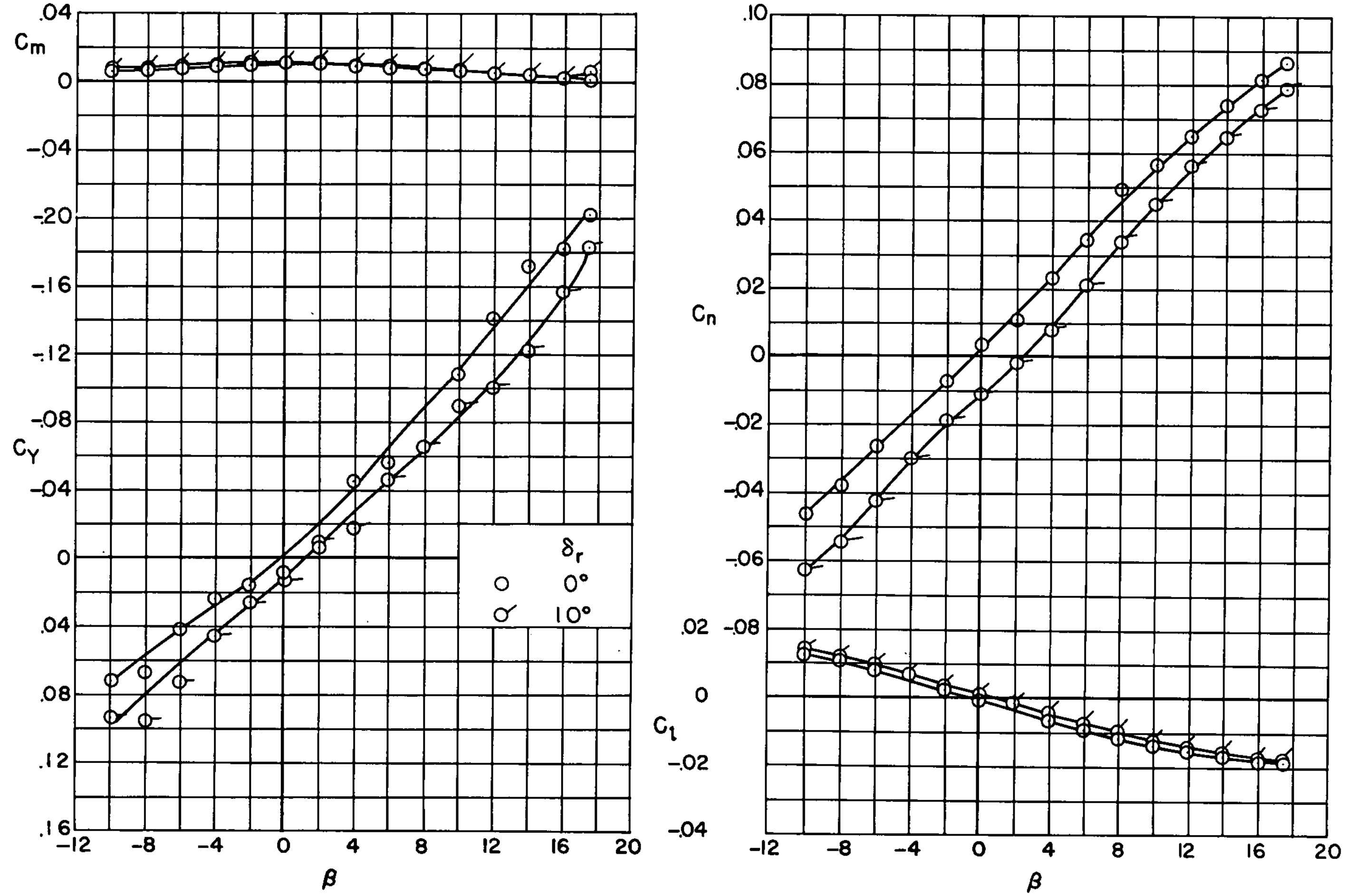
Figure 23.- The effect of rudder deflection on the lateral stability characteristics of the mid-wing model; $l_V/b_W = 0.599$, $S_V/S_W = 0.267$, $\beta = 0^{\circ}$.



(b) M = 0.90 and 0.95

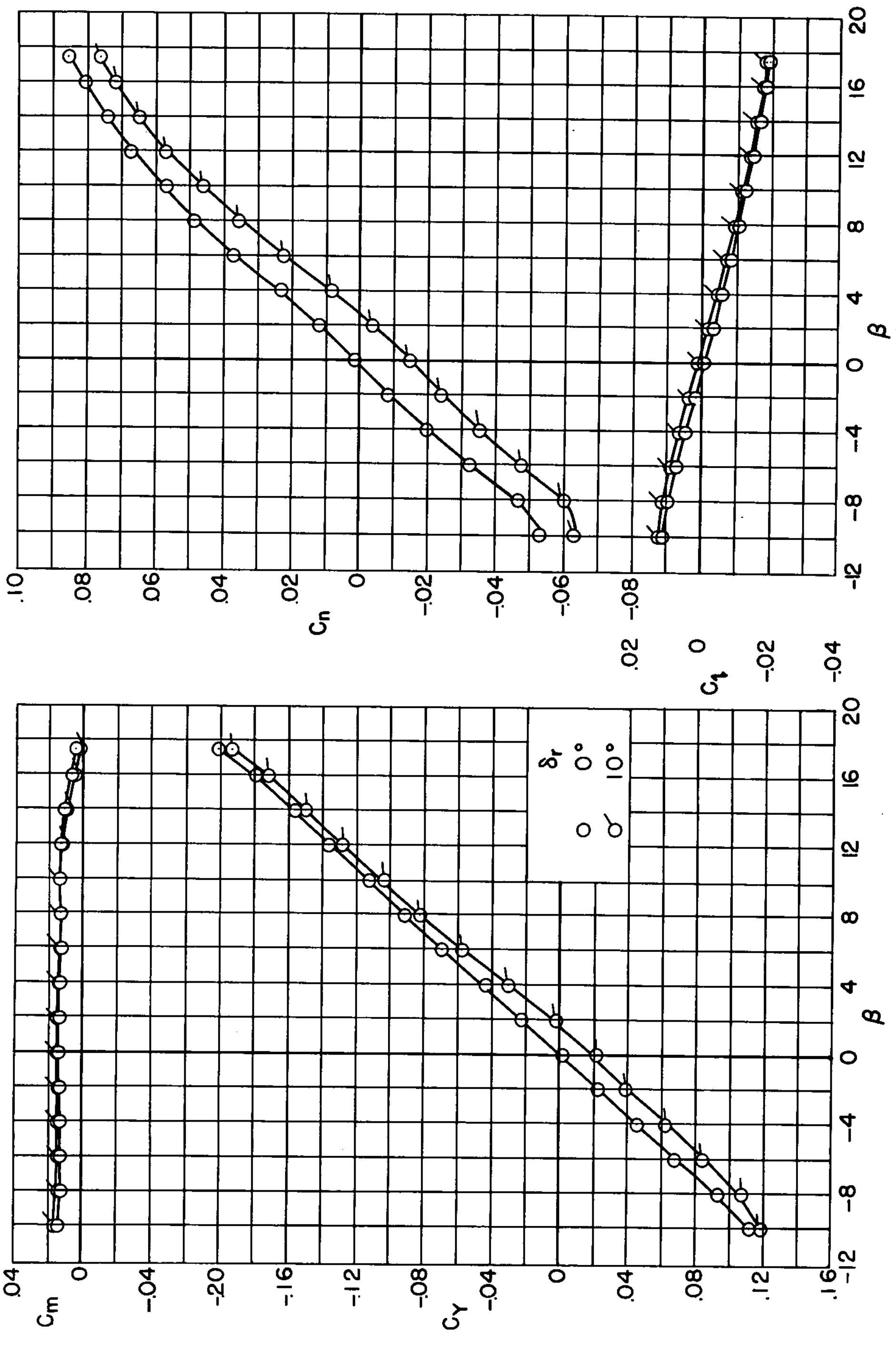
Figure 23.- Concluded.

[redacted]



(a) M = 0.25

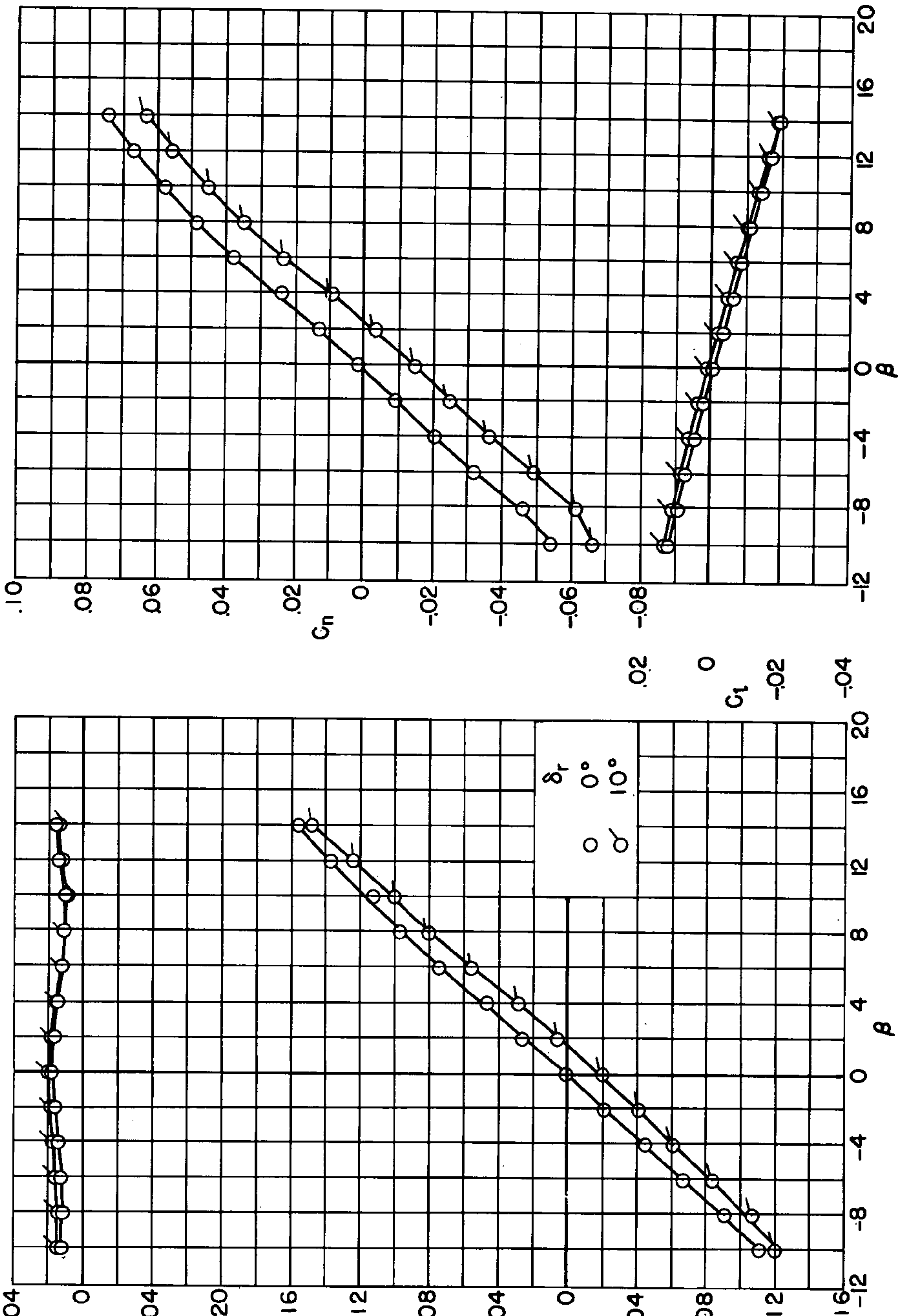
Figure 24.- The effect of rudder deflection on the stability characteristics of the mid-wing model; $l_V/b_W = 0.620$, $S_V/S_W = 0.203$, $\alpha_u \approx 6.3^{\circ}$.



(b) M = 0.80

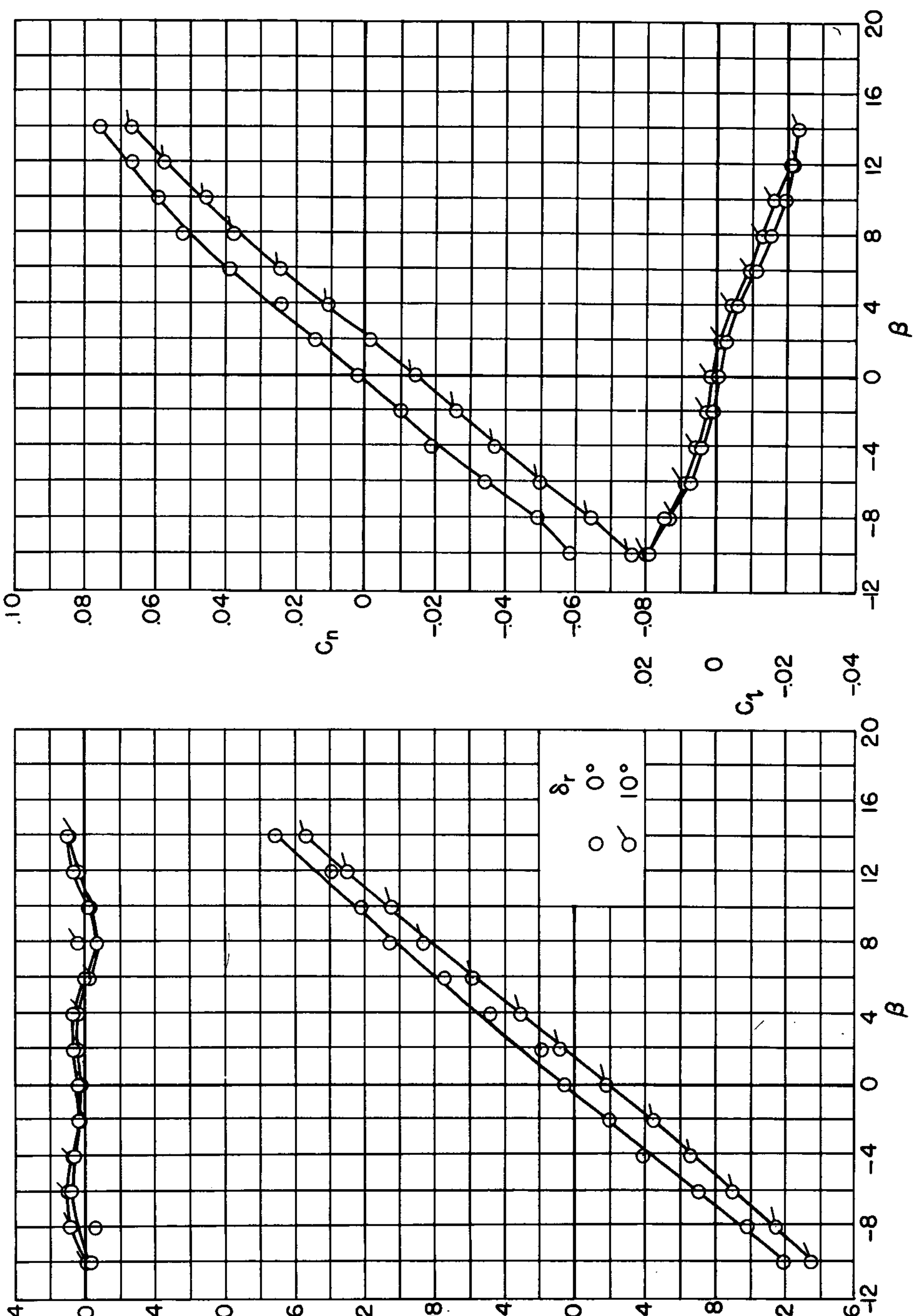
Figure 24.- Continued.

[redacted]



(c) M = 0.90

Figure 24.- Continued.



(d) M = 0.95

Figure 24.- Concluded.

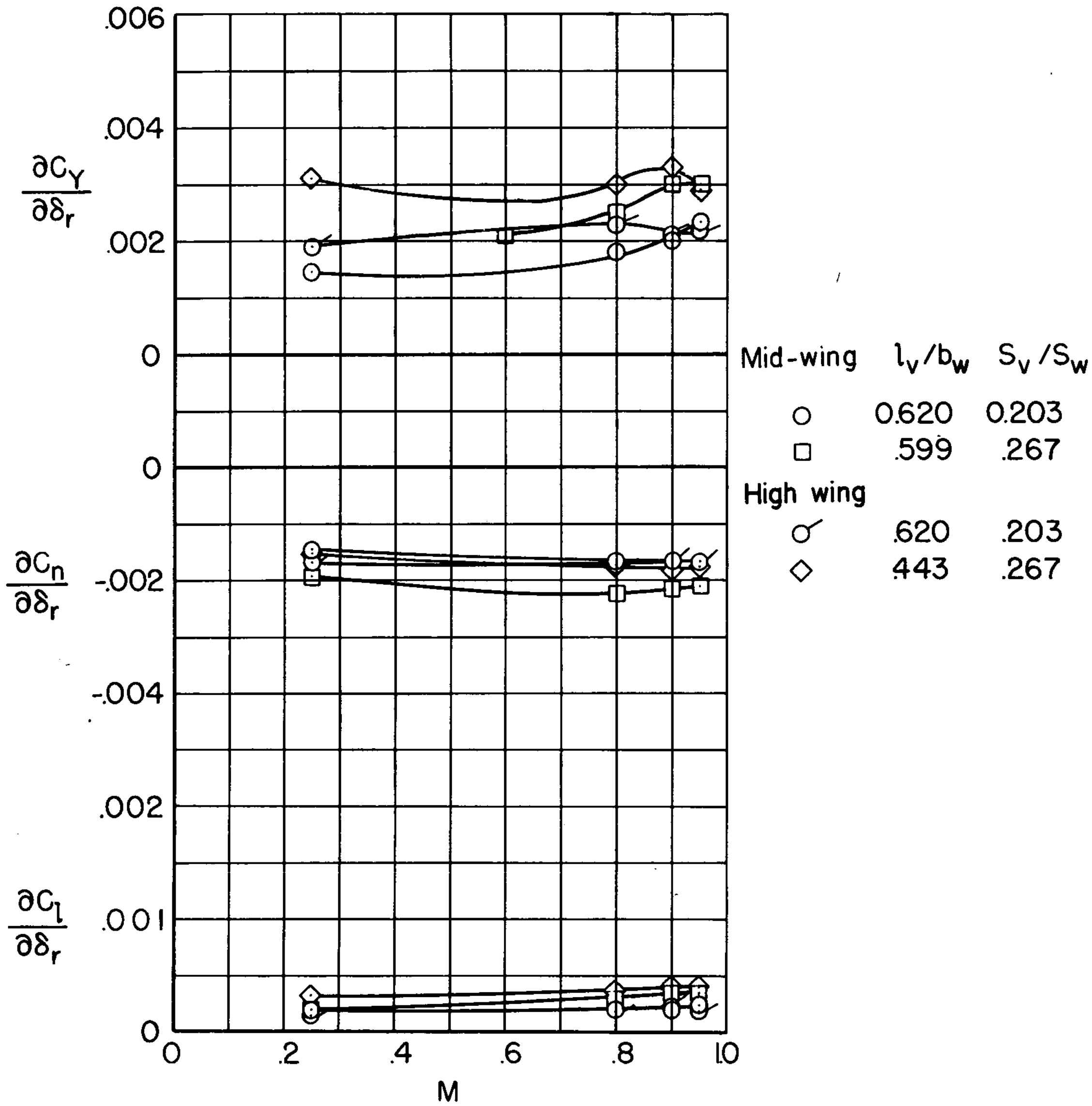


Figure 25.- The effect of Mach number on the rudder-control characteristics for several configurations; $\alpha_u \approx 6.3^\circ$, $\beta = 0^\circ$.

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